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‘I hope that I get old before I die’: ageing and the concept of disease

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Abstract Ageing is often deemed bad for people and something that ought to be eliminated. An important aspect of this normative aspect of ageing is whether ageing, i.e., senescence, is a disease. In this essay, I defend a theory of disease that concludes that ageing is not a disease, based on an account of natural function. I also criticize other arguments that lead to the same conclusion. It is important to be clear about valid reasons in this debate, since the failure of bad analyses is exploited by proponents of the view that ageing is indeed a disease. Finally, I argue that there could be other reasons for attempting to eradicate senescence, which have to do with an evaluative assessment of ageing in relation to the good life. I touch on some reasons why ageing might be good for people and conclude that we cannot justify generalized statements in this regard.

Keywords Ageing · Senescence · Disease · Boorse · Caplan

Introduction

Whether or not ageing is a disease is not only of considerable theoretical interest but also bears some important normative consequences. A disease is usually regarded as a reasonable basis on which to justify claims on health care resources. So, the conceptual issue becomes a normative, indeed a political, problem. ‘Judging that some condition is a disease commits one to stamping it out. And judging that a condition is not a disease commits one to preventing its medical treatment’ [1, p. 171].

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Against this statement, I will reject a direct connection between calling something a disease, or denying it disease status, and the question of whether we ought or ought not to treat the condition in question. Proper health care is not merely concerned with diseases (cf. [2, p. 242]). However, I do agree that the conceptual question has some influence on the normative problems regarding ageing, because if ageing is a disease, there is a *prima facie* claim on using health care resources for its treatment and on funding related research. Nevertheless, I will treat the theoretical question, whether ageing is a disease, and the normative question, whether we ought to attempt to eradicate ageing, separately.

The term 'ageing' has at least two different meanings. First, it can refer to what we may call chronological ageing, i.e., the time already lived. One ages from the beginning of his life under this interpretation, although we usually begin to speak of ageing in persons at a later stage in their lives, namely, in old age. Ageing understood as chronological ageing need not be disvalued; in fact it is often welcomed. People usually want to reach a ripe age, unless they suffer from severe impairments. This is what brings us to the second meaning of the term. 'Ageing' can also refer to the decline in certain abilities during life. We may call this biological ageing, but a more common term is 'senescence'. Since we are used to seeing frailties and disabilities in old age in contrast to conditions before ageing takes its toll, we commonly disvalue the process of ageing under this interpretation of the term. It seems that we are worse off in terms of bodily and mental abilities in old age than before.

In this paper, I will use the second interpretation of ageing, i.e., ageing as senescence. Since I am concerned with the question of whether ageing may be a disease, this seems natural. However, when people want to overcome ageing, they usually combine both interpretations: they want to live longer and without a decline in the abilities they have reached in their mature life. Ageing from the chronological point of view might be regarded as a disease because it grants us only a limited amount of time to live—currently 122 years at best. Be that as it may, I will focus on senescence and will have very little to say on longevity.

The distinction between the two different senses of ageing is also important when we attempt to evaluate scientific findings in gerontology. Recent research is often related to the extension of chronological age, e.g., by focusing on telomeres or free radicals (cf. [3]). But what would be the point in living a longer life if we were not healthy? So the main aim must be to get rid of the debilitating effects of old age. How likely is it that we will succeed in this pursuit? People rarely die or develop degenerative diseases because of 'internal', or genetic, processes. It is more likely that senescence is mainly due to environmental factors like pollution, heavy labour, unhealthy lifestyles, and giving birth. Although researchers working with mice or certain worms (cf., e.g., [4]), most commonly *C. elegans*, stress that their findings not only establish ways to extend life but also do so without a severe decline in abilities, one might wonder if this can really be achieved when senescence is mainly due to external factors. I, for one, have never seen a worm or a mouse indulging in binge drinking, eating an English breakfast, or performing risky sports. Quite possibly, the research being done may only help us overcome ageing if we give up

certain unhealthy lifestyles and habits, which might be too high a price to pay. Most people would prefer an unhealthy shorter life to a long drab life.

Another problem with the research is its reductionist and simplistic view of human organisms. Although artifacts age too—and not only chronologically—the human organism is many times more complicated. Leonard Hayflick stresses that 'even with the most advanced technology known today, we cannot control the rate of ageing in something as infinitely less complicated as our own automobiles' [5, p. 3]. So, how likely are we to succeed in finding a treatment for ageing if, firstly, we cannot even succeed in this task with fairly simple artefacts, and, secondly, almost all human characteristics, especially the processes resulting in senescence, are not purely genetic but extremely complex? [6]

However, I do not want to speculate about the scientific basis of gerontological research and will instead focus on theoretical and normative issues surrounding this research. In the next section, I will query whether the medical profession considers ageing to be a disease. Since I do not believe that there is a consensus on this in the health care professions, I will focus on the theoretical debate over the concept of disease in the section following. In the third section, I will introduce a particular theory of disease developed by Christopher Boorse. According to his theory, ageing is not a disease. However, I do not believe that there is a single true definition of disease. So in the end, it is our decision to endorse a particular theory of disease on grounds not only of rational argument but also of particular interests, e.g., containment of health care resources. In the fourth section, I will examine several arguments against calling ageing a disease that have influenced the debate, and I will discuss Arthur Caplan's influential defence of the view that ageing is indeed a disease. The fifth section changes perspective by focusing on the normative question of whether we should eradicate senescence. I do not believe that the theoretical debate can settle these normative issues. Even if we do not call ageing a disease, we might still have good reasons for treating it by medical means. This section will be rather inconclusive because I believe that the evaluation of senescence is an individual matter. Nevertheless, I will conclude that there is no general duty to search for a "cure" for senescence because it need not always be in the best interests of a person to get rid of ageing.

Is ageing regarded as a disease in medicine?

In 2002, the *British Medical Journal* ran a vote on its website. The purpose was to identify conditions that were regarded as 'non-diseases.' A list of roughly 200 potential non-diseases was assembled and then put to a vote of the journal's readers. The condition that came out on top was ageing [7, p. 885]. It is tempting to infer from this survey that at least medical professionals do not see ageing as a disease. However, things are a bit more complicated. Strictly speaking the ballot did not ask respondents to identify conditions that were not regarded as diseases, but to recognize 'non-disease', which is a term of art referring to 'a human process or problem that some have defined as a medical condition but where people may have better outcomes if the problem or process was not defined in that way' [7, p. 885].

So it is possible that voters were of the opinion that people who are affected by ageing are actually better off if their condition is not called a disease. This is compatible with the belief that ageing is indeed a disease, and it is also compatible with being neutral about this issue.[1]

Another reason we cannot just infer from the study that ageing is not seen as a disease in medicine is that—according to the definition—the potential non-diseases had been defined by some people as medical conditions. So obviously ageing had been regarded as a disease at some point in medical history. This is not surprising because many human problems have at some point and by some people been drawn into the remit of medicine, or 'medicalised', as we now call it.

The *BMJ*'s vote can nevertheless teach us something interesting about the concept of disease. Imagine that a top biological journal holds, in a similar way, a vote on the question of which organisms are considered non-mammals by their readers. They might add a specification that by 'non-mammal' they mean 'an organism that some have defined as a mammal but where it may have better outcomes if it were not defined in that way'. I suspect it is a fair guess that most of us would find this exercise ludicrous. But why is not the *BMJ*'s ballot absurd too? It probably is because the concept of disease has no sharp boundaries.[2] There is not even an agreed upon standard definition of disease in medicine, hence quarrels are possible not only about which condition actually falls under the concept of disease but also about what 'disease' means in the first place. Any human condition and problem could potentially be part of the extension of the concept of disease.

So far, I have described the facts of medical and common language. Medicine does not speak with one voice, and there are many different theories of disease. It is therefore impossible to merely refer to medical parlance if we want to find out whether ageing is a disease, or even whether it is perceived as a disease by the medical profession. A definition of disease cannot just be descriptive, a pure condensation of the actual linguistic usage. Harry Moody makes virtually the same point: 'To call aging a disease isn't a description of current language so much as it is a decision about how we're going to use language. Ordinary language, like scientific language, can change over time. But the decision here has a big consequence, and the consequence is that we begin to think of aging as a condition that can be changed, even altered or abolished' [9, p. 5].

A common way to deal with the pluralism of disease theories is to find out whether any theory suffers from logical flaws and can therefore be rejected. In this paper, I will endorse a particular theory of disease I find most plausible and consider whether ageing is a disease according to this theory. A more thorough way of

[1] Note the difference between asking for an opinion on whether ageing is bad for the affected person and asking for an opinion on whether it is disadvantageous if ageing is called a disease. Arthur Caplan and Harry Moody had an interesting exchange on the latter question [8]. Caplan sees benefits for defining ageing as disease, because it would justify claims to funding for research and give an excuse for certain behaviour that is due to senescence. Moody, on the other hand, senses that old people might be held individually responsible and be blamed for their disease status, if they do not do anything about it.

[2] An explicit purpose of the *BMJ* was 'raising consciousness about the slipperiness of the concept of disease' [7, p. 885].

dealing with the topic of whether ageing is a disease would be to scrutinize available theories of disease in more detail, but this cannot be done here.

After weeding out flawed theories, there may still be a couple of plausible approaches left, and a further criterion for choosing might be which theory best serves specific purposes. A social interest I consider important in connection with the concept of disease is its potential gate-keeping function. Usually we believe that diseases ought to be treated by the medical profession. Many societies combine acknowledgement of disease with a *prima facie* claim to the use of health care resources that are provided by welfare institutions. The debate over the disease status of ageing is mainly due to associated economic benefits. To render ageing a disease would result in a potentially bottomless drain of resources, so I believe it would be wise to subscribe to a theory that rules out ageing as disease and, therefore, keeps related problems out of a socially financed health care system.

To be sure, many people will probably object that, firstly, it is not the right approach to choose theories on the basis of external interests. The best theory ought to be chosen on grounds of its scientific merits, i.e., providing the most convincing explanation of the phenomena. If the best available theory of disease maintains that ageing is a disease, then it is a disease, period. Secondly, does it not amount to a kind of discrimination, ageism, if we exclude ageing as a potential disease from the outset? The first objection raises the problem of the truth-value or objective justification of disease theories and, in consequence, of scientific realism. I cannot deal with this question, but I believe the history of theories of disease at least speaks against a naïve realist point of view. There are different reasonable ways to explain and define the phenomena. The second objection concerning ageism is, I believe, wrong, because the criterion for having a justified claim to medical treatment is disease, not age. It is admittedly a narrow understanding of disease, leaving no leeway for the inclusion of ageing. However, the criteria for conditions to be classified as disease are, to my mind, convincing. So the exclusion of old age from the use of publicly funded resources is only secondary to endorsing a theory that generally curbs medicalization.

It is worth briefly mentioning at least one theorist who in fact defends the view that ageing is a disease, Arthur Caplan.[3] Caplan says:

> It could be argued that processes denoted by the term 'ageing' do not fit the standard concept of disease that operates in clinical medicine. However, in medical dictionaries, disease is almost always defined as any pathological change in the body. Pathological change is inevitably defined as constituting any morbid process in the body. And morbid processes are usually defined in terms of disease states of the body. Regardless of the circularity of this concept, ageing would therefore seem to have a *prima facie* claim to being counted as a disease. [10, p. 73]

[3] There are, of course, more. Transhumanists in general and several biogerontologists, such as Aubrey de Grey, believe there is, or ought to be, a 'cure for ageing'. Ralph Waldo Emerson supposedly stated: 'All diseases run into one, old age.'

Although Caplan explicitly points out the circularity of the medical dictionaries, he draws the conclusion that ageing can at least *prima facie* be counted as disease. But, of course, the claim begs the question because whether disease is a *morbid* process is the very issue to be discussed. We might assume that the phrase 'morbid' refers to processes in the body leading to accelerated death. Ageing obviously shortens our life, and so it might be a morbid process. But if we choose this definition of morbidity, it seems very doubtful that medicine regards '*any* morbid process in the body' as pathological. Puberty also involves processes that might be regarded as morbid under this definition, e.g., lack of clear thinking and propensity to risky behavior, but no medical textbook defines puberty as a disease.[4] Acceleration or higher risk of death cannot be a reasonable criterion of the pathological.

However, whether Caplan succeeds in giving an accurate description of the medical point of view is not the most important issue. First of all, as it has been argued in this section, there is no single medical theory of disease, and secondly, if we read Caplan's argument a little more charitably, we might point out that ageing indeed seems to share many features with *bona fide* diseases, especially a decline in bodily and mental functions. I will come back to this point and argue that, nevertheless, ageing is not a dysfunction, which to me is the mark of disease.

There is yet another important aspect of the debate over whether ageing is a disease, namely, which side has the burden of proof. As will be seen, Caplan mainly proceeds by rejecting arguments that deny that ageing is a disease. But if these arguments fail, has it been shown that ageing is a disease? I should think it is fair to shift the onus to the side in the debate that tries to establish ageing as disease, because it is the more uncommon one and a point of view rejected by the majority of medical professionals. In the fourth section, I will discuss some of the flawed arguments for why ageing cannot be called a disease. But I will also develop a positive line of reasoning by utilizing a particular theory of disease, to which I will now turn.

A theory of disease

Before I discuss several arguments for why ageing ought not to be regarded as a disease, I will briefly introduce a particular theory of disease, which I endorse. Admittedly, it is a contested theory, and it might be a bit disappointing that I take it for granted for the purposes of this paper. However, I believe that for the main points I want to make about the assessment of ageing in relation to pathological conditions, I need not address the known objections to this theory. The theory I defend was developed in the 1970s and refined in a series of successive articles by the American philosopher Christopher Boorse [11–15]. His naturalist or, more specifically, bio-statistical theory has become extremely influential, although often as an object of critique; in fact, there are very few whole-hearted supporters.

[4] To be sure, the American writer Dorothy Fulheim is reported to have said, 'Youth is a disease from which we all recover.'

Nevertheless, it is usually seen as a useful theory for medical science—if not as a sufficient account for medical practice because it does not address the issue of harm.

Boorse defines the concepts of disease and health as follows [13, p. 555]:

1. The reference class is a natural class of organisms of uniform functional design; specifically, an age group of a sex of a species.
2. A normal function of a part or process within members of the reference class is a statistically typical contribution by it to their individual survival and reproduction.
3. Health in a member of the reference class is normal functional ability: the readiness of each internal part to perform all its normal functions on typical occasions with at least typical efficiency.
4. A disease is a type of internal state which impairs health, i.e., reduces one or more functional abilities below typical efficiency.

Boorse defends a 'goal-theory' of functions, i.e., he sees functions as processes that contribute to goals.[5] Since organisms are structured in a complex way, functions exist on different levels. The goal of a function is determined by a function on the higher level, which again is determined by a higher function and so on. So the highest goals of an organism determine the functions down to the lowest levels. Only processes that contribute to these highest goals are called functions. Regarding the debate over the somatic concept of disease, physiological interests seem to have priority, and these are committed to survival and reproduction as the highest goals of functions.[6] When these highest goals are laid down, empirical examinations determine which processes contribute to their fulfilment, i.e., statements concerning functions are objective. The function of the heart is to pump blood and not to produce noise. Only the former process (normally) contributes to individual survival and reproduction.

Functions are standardized contributions to individual survival and reproduction, i.e., they refer to features that are typical contributions to these goals in a particular reference class. Hence, assertions about functions describe characteristics of a reference class and not individual organisms. It is possible to determine such characteristic functions and their hierarchy for every species by making statistical idealizations. By this exercise, one arrives at ideal types that lay down a model of the species: the species design. The concept of a species design does not refer to the functions of a species for all time, i.e., it is open for evolutionary developments. Nevertheless, it is suitable as a basis for statements regarding the state of health of a living being, because it reflects the high uniformity of species-typical functions. To be sure, it is relative to an evolutionary perspective but still not relative to an individually specific environment. 'On all but evolutionary time scales, biological designs have a massive constancy vigorously maintained by normalizing selection. It is this short-term constancy on which the theory and practice of medicine rely….

[5] The most important competing theory of functions is the 'aetiological'. Supporters of this theory are Ruth Garrett Millikan [16] and Karen Neander [17]. Jerome Wakefield [18, 19] purports a similar aetiological theory of function in the context of the debate on the concept of disease.

[6] See [20, p. 84]. An interesting question is whether these goals also apply to mental functions. I have dealt with this issue at some length in [21].

Our species and others are in fact highly uniform in structure and function…. This uniformity of functional organization I call the species design' [13, p. 557].

Boorse needs to add two restrictions to this uniformity. The species design can only be determined relative to sex and age, since, for example, women and men have different sexual organs with different functions that cannot just be entered disjunctively as in the case of different blood groups, which differ but nevertheless serve the same functions. The same applies to changes in the organisation of physiological functions according to age. This is especially straightforward concerning organisms that develop through distinct stages of life, like a caterpillar that turns into a butterfly. In every stage of life there are different functions, and the species design differs accordingly. Human beings also develop through distinct stages. For example, we find particular functions like the growth of bones only in childhood. So the concept of species design determines the functional organization of a reference class that is smaller than the respective species.

> In medical applications, the operative class seems to be an age group of a sex of a species, e.g., human male neonates or, say, 7–9 year old girls. In other contexts, perhaps even in medicine itself, one would have to factor in race as well, since in some respects the different races have different functional designs. Despite this contradiction of the reference class to a fraction of a species, the term 'species design' is still convenient and seems unlikely to cause confusion. [13, p. 558]

In order to make judgements about disease, it does not suffice to find a deviation from the species design, because it is conceivable that an organism does not correspond to the ideal type but is nevertheless healthy. Boorse therefore needs to explain what normal functioning means. To do this, he introduces the term 'efficiency': 'Normal functioning in a member of the reference class is the performance by each part of all its statistically typical functions with at least statistically typical efficiency, i.e., at efficiency levels within or above some chosen central region of their population distribution' [13, pp. 558f.].[7]

The concept of efficiency serves to prevent misinterpretations that may arise from the concept of function. Excessive secretion by the thyroid gland is not above average functioning but is abnormal functioning, since the function of the thyroid gland is not just secretion but secretion of a particular amount of hormones. 'For us there is no such thing as excessive function. But to keep the formulation unambiguous, I use the term "efficiency". What health always allows is unusual efficiency of a process in serving physiological goals' [13, p. 559]. So Boorse is indeed using criteria of statistical normalcy for his definition of disease, but his theory is not exclusively composed of statistical norms. It is supplemented by the concept of function, which is defined biologically. The biological aspect helps to exclude statistically abnormal conditions like being red-haired as dysfunctions. Hair colour does not play any role in terms of functions.

[7] Note the reference to a *chosen* region. It seems that values come into play, as Boorse himself notices: 'It has been suggested that how much abnormality counts as disease varies from function to function for reasons of value. If such variation can be shown, perhaps even negative health is value-laden in this minimal way' [13, p. 571].

This explanation shows that in order to count as a disease in Boorse's sense, a process does not need to actually threaten individual survival or the ability of reproduction. This would be an obvious misinterpretation—and it is indeed a common one. It is due to the fact that Boorse defines functions by referring to survival and reproduction as the highest goals. But the relevant criterion for the attribution of disease is an impairment of function, not that a process is life-threatening or reducing reproductive capacity. To be sure, functions are characterized by their contribution to individual survival and reproduction. But it only follows that a function makes survival and reproduction more likely. Since functions form a system on different levels, not every breakdown of even the tiniest contribution to the fulfilment of the highest goals needs to threaten their realization. In Boorse's theory, there is no statement concerning the actual consequences of a functional impairment. 'To say that physiological functions are contributions to individual survival and reproduction is not to say that their failure will be fatal in any particular case' [13, p. 561].[8]

According to Boorse's theory, ageing is not a disease because it is not a dysfunction. Functions are established relative to age groups, so processes that are functional earlier in life are not necessarily functional later in life. For instance, the ability of cells to grow quickly ceases to be a function because it is not a standard contribution to individual survival and reproduction in old age. On the contrary, it is statistically normal for cells to grow slower when the organism becomes older. And even if we were to accept certain mechanisms as functions during the whole adult life of human beings, typical processes in old age would still not count as dysfunctions because they are statistically normal.

There is another common way to establish ageing as disease, which is not based on seeing disease as intrinsically pathological, and which is also rejected by Boorse's theory. Some people point out, rightly to my mind, that if we could increase the individual 'healthspan' or compress morbidity, we would improve health dispositions or positive health [25, p. 459]. It might therefore follow that ageing should be regarded as a disease, since it impairs the individual's health disposition. But on the account I have defended, there are grades of health. Disease is a condition located below the threshold of minimal health. It is quite possible that some people are healthier than others because they are more fit or have better dispositions, but this does not establish that unfit people are suffering from a disease. Therefore, even if it would be possible to extend the human 'healthspan', this would not imply that we would thereby treat a disease.

[8] It is therefore wrong to try to lead Boorse's theory *ad absurdum* by claiming that every life-threatening condition like driving races would involve a dysfunction and hence a disease in his sense [22, p. 44]. Dysfunctions are not identical to impairments of individual survival and reproduction, even though particular processes become functions because of their contribution to individual survival and reproduction. Maybe this misunderstanding is due to a confusion of Boorse's with Scadding's [23] account, who proposes 'biological disadvantages' as criterion of mental illness. For example, Kendell [24], who takes up this criterion and interprets it to mean increased mortality and reduced fertility, discusses empirical findings regarding impaired fertility and increased mortality of mentally ill people. However, Boorse does not introduce survival and reproduction as criterion of health or disease but as criterion for the identification of functions, and these are characterised as biological organismic processes. Not every threat to individual survival or reproduction is a dysfunction and therefore a disease.

Some reasons for not calling ageing a disease

I now want to scrutinize several reasons that can be found in the philosophical literature for not calling ageing a disease. Showing why some of these arguments are wrong or inconclusive will further support the theory I have introduced rather apodictically in the preceding section. Boorse's theory can help us to see the right arguments for rejecting ageing as disease and to show why supporters of the view that ageing is a disease often deal with the wrong kind of reasons. They knock down bad arguments and in so doing let their own approach shine. But this, if successful, is a cheap and merely apparent victory, as they do not discuss the best argument, namely, that ageing is not a disease for the reason that it does not involve any functional disability.

Many people believe that ageing cannot be a disease because it is natural. But for several reasons this is a red herring. First of all, the concept of naturalness is notoriously ambiguous. In fact, according to one reading of 'natural', disease is itself a natural event. More importantly, whether an event is unnatural or natural cannot determine whether it is pathological or not. So we need to be wary of this kind of argument.

Caplan specifically highlights the 'ageing is natural' argument. In fact, he spends a lot of time in his articles showing that ageing may as well be regarded as unnatural. 'The perception of biological events or processes as natural or unnatural is frequently decisive in determining whether physicians treat states or processes as diseases' [26, p. 727]. But since something being natural cannot establish that it is not pathological, it can also not be shown by stating that ageing is unnatural that it is a disease. I believe that in light of Boorse's account, we can now see more clearly that Caplan's argument is targeting the wrong issue. Whether disease is natural is not significant. Boorse can explain why the decisive question is whether a certain condition is a dysfunction or not, instead of its unnaturalness. To be sure, the standard of something being a function is indeed determined by a mix of evolutionary biological and statistical facts, and this is sometimes referred to as establishing a 'natural function'. But it is not implied that a dysfunction is unnatural. Therefore, whether ageing is a disease does not depend on whether it is a natural event, but whether it is a dysfunction. This, of course, is simply a restatement of Boorse's criterion, but I believe the fact that naturalness cannot be a sufficient criterion of disease either way is clearly visible from that perspective.

Some people believe that ageing cannot be called a disease because it is inevitable and affects everybody. Again, Caplan rejects this argument. He correctly stresses that ageing is not inevitable in the logical sense of the word. We could certainly think of a world where ageing would not occur. It just happens to be a contingent fact about the kinds of beings we are. However, Caplan concludes from this that ageing is unnatural, and as we have just seen, for him, this supports the 'ageing-is-disease' point of view. He claims:

> I think aging is an accident. It's not natural. It's just a result of the biological history of our species.… So just to recap: Aging looks like disease, and the only reason we don't call it a disease is that we think of it as universal and

> natural. But it isn't always universal, because it happens to different people at different rates. And I don't think it's natural. I think it's unnatural. It's something that just got designed into us [8, p. 5].

However, this surely is an unconvincing argument, since by Caplan's logic every biological feature of human beings is unnatural, because it 'just got designed into us'.

We need to wait and see on whether ageing is alterable or not. But rejecting the logical necessity of ageing is not enough to show its unnaturalness or its *bona fide* disease status. In general, conditions that are unavoidable now and that are statistically normal, i.e., without an alternative route of events in this world, cannot be a disease. After all, if we did not rely on the actual limits of human beings, all kinds of deficits could be diseases. For instance, the inability to fly is not a logical necessity of being a human; so might we call our inability to fly a disease? I conclude that the factual impossibility of eliminating ageing here and now, in combination with the fact that it is normal on the bio-statistical account, is a good reason for not calling it a disease. Admittedly, ageing might be avoidable in the future. If and when this is possible, it might become a disease. Caplan, however, fallaciously takes the allegedly contingent nature of ageing to argue that it is unnatural.

I believe that Caplan makes another mistake: when he introduces the notions of design, purpose, and function, he asserts that the 'ageing is no disease' supporters would need to show that ageing serves a specific function.[9] So this is a potential further argument against seeing ageing as disease, namely, that it might serve a function. According to Caplan, possible functions might be God's punishment for our sins or to make way for new generations [26, p. 729]. He plausibly rejects both interpretations of the function of ageing. But he has set up a straw man, because in order to show that a particular process is not a dysfunction, we do not need to claim that it serves a function. The mechanism might not be related to functions at all. Indeed, it would be very implausible to maintain that every bodily condition or process is either functional or dysfunctional. For example, it has already been said that the beat of the heart is not a function but just an effect of its function, which is to pump blood. Hence, the very position Caplan attacks is based on a false premise: to show that ageing, or any other mechanism for that matter, is not dysfunctional, we do not need to say that it serves a function.

Although I have just claimed that it is not *necessary* to establish that ageing serves a function in order to argue that ageing is not a disease, it would nevertheless be a strong reason to reject the interpretation of ageing as disease if we *could* establish such a function. There are some theorists, especially evolutionary biologists, who indeed see a function in ageing. The most convincing explanation of a function of ageing is the benefit for the young generations and, therefore, species survival. However, since I think that arguments for group selection are weak, I do not believe that we can use such evolutionary accounts to support the claim that ageing in not a disease.

[9] To be sure, Caplan claims that 'our willingness to accept aging as a *natural process*' (emphasis added) depends on showing that ageing has a function [26, p. 729]. But that does not change my objection to his argument.

Another argument raised against ageing being a disease, is the claim that ageing might be a non-functional, i.e., epiphenomenal, effect of adaptive functions, which are performed earlier in life. Two accounts of the underlying adaptive functions are the ability of cells to grow quickly, which is very important in many stages of life [2, 27] and, similarly, Thomas Kirkwood's 'disposable soma theory'. According to the latter view, evolved limitations in somatic maintenance and repair functions are responsible for ageing processes [6, p. 6]. Regardless, the claim is that it is implausible to call an effect of a natural function dysfunctional and, therefore, questionable to call ageing a disease.

However, this argument relies on two assumptions. Firstly, that ageing is a necessary result of maintenance and repair functions. If we could keep these functions without their long-term effects, ageing might turn into a dysfunction. The argument secondly depends on the assumption that it is absurd to interpret a necessary result of a natural function as dysfunction. This can be contested: if we can indeed call ageing a dysfunction, or a disease for that matter, because of its detrimental effect on human well-being in old age, the argument fails.

As regards the first point, I believe we must leave it to the gerontologists to establish whether maintenance and repair functions can be kept for a longer or even indefinite time in an individual's life.[10] The second point introduces a modification in perspective, i.e., a change from a descriptive to a normative point of view. We might want to call a process that inevitably results from a natural function dysfunctional or a disease for normative reasons because, e.g., we want to have a proper rationale for treating ageing by medical means. In order to scrutinize this assumption, we would need to inspect arguments discussing whether ageing is good or bad for us. I will come back to these arguments in a later section. For now, I will only mention that on the naturalist account I have defended, the question of whether a process is disvalued is irrelevant to establishing whether it is a dysfunction or a disease.

The final argument I want to discuss in this section consists in agreeing that ageing is not a disease but maintaining that there are several diseases of old age. For instance, Walter Glannon writes: 'Aging itself is not a disease. But the diseases resulting from the gradual deterioration of the growth and repair mechanisms of cells are part of an age related process' [29, p. 345]. If most, or all, age-related processes are indeed diseases, the question of whether we can call ageing itself a disease seems to be an irrelevant point.

However, although many problems encountered in old age are treated by medical means, they themselves are not straightforward diseases.[11] Even the disease status of, e.g., Alzheimer's is contested because, at least in minor cases, its symptoms are

[10] If it should prove impossible to maintain the earlier functions without detrimental effects on later biological processes, it seems to follow that if we change functions in mature life to prevent ageing, we may cause serious health problems, e.g., a weakened immune system, before the beneficial effects can kick in (cf. [28, p. 12]). Glannon [29, p. 346] makes a similar point when he discusses possible germ line interventions to prolong life. The effects on future generations could be harmful because genes would be maintained that would have been selected against without human intervention.

[11] I believe it is obvious that treatment by doctors cannot serve as a convincing criterion for calling something a disease. On the other hand, it is also obvious that medicine may treat problems that are not diseases. So a decline of abilities in old age may be treated by medical means even when it is not called a disease.

statistically normal at some age. Many conditions that involve the loss of formerly functional abilities are not dysfunctions, at least on Boorse's account, because they are normal for the specific reference class. For example, infertility after menopause is normal for women and is very rarely regarded as a disease in medicine.[12]

Having rejected the wrong assumptions that have led some authors to the conclusion that ageing is not a disease, I can now show for what reasons it is indeed plausible to hold such a view after all. On Boorse's account, it is wrong to generally use the term 'loss of function' or 'dysfunction' in reference to conditions of old age. After all, many mechanisms cease to be proper functions because the functional design of human organisms is specified relative to age groups. However, in other cases, processes are functional over the whole life and it is only, as it were, the threshold of dysfunction that is raised. Being able to walk is functional during the whole life course, but the normal speed in which human organisms are able to fulfill this function gradually changes. Severe cases of impaired functional abilities, like cancer, may therefore still be called dysfunctions, even though a statistically normal decline would not count as pathological. So an impaired ability or deterioration in growth and repair mechanisms due to old age is not the decisive factor in determining whether a certain condition is a disease, but its bio-statistical abnormality is.

In this section, I have scrutinized some unconvincing arguments in the debate over whether ageing is a disease. In order to deny ageing a disease status, we need a plausible theory of disease. Such a theory was introduced in the previous section, and I have used it in this section to find plausible reasons for not calling ageing a disease. Ageing itself and many related processes are biologically and statistically normal processes in the life course of biological organisms and are therefore not pathological, according to the theory I have defended. However, I also stressed at the beginning of this paper that I do not see conclusive internal support for accepting a particular theory of disease. We might find good reasons for calling ageing a disease after all, especially because we might want to treat it by medical means. But we might also treat it without calling it a disease. So the normative discussion seems to be more or less unrelated to the theoretical debate over whether ageing really is a disease or not. I will end my paper by discussing some of the normative arguments about whether we ought to treat or even eradicate senescence.

Should we attempt to eradicate senescence?

Although I have introduced some theoretical arguments for not calling ageing a disease, it is part of the debate to ask, in a normative fashion, whether we ought to treat or attempt to eliminate ageing. In fact, many people believe that the theoretical and normative questions are closely related. I do not agree, and I have therefore split the issues. I will now, in a separate section, directly address the normative question of whether we should prevent ageing. Before that, it might be worth stressing again

[12] To be sure, there are important borderline cases, which have already been discussed in the relevant literature, especially post-climacteric osteoporosis (cf. [30, p. 170; 15, p. 92]).

my concession that there are serious diseases, like cancer, which befall people often in old age. These diseases obviously ought to be treated, and it might happen that a cure for these diseases is to be found by intervening in the processes of ageing. Yet, the question I want to raise in this section is whether we ought to get rid of senescence altogether, i.e., eradicate even the less severe frailties of senescence.

Many arguments against the search for a medical treatment of ageing are in fact arguments against longevity. Many people have claimed, for example, that it is better for the species if we die, because otherwise the already severe scarcity of resources would be worsened [31, p. 178]. I have already established that longevity and senescence are in principle separable issues (cf. [32, p. 186; 33]), and I am here interested in senescence only. If it is indeed impossible to improve abilities in old age without also extending the life-span, i.e., if biological and chronological age are necessarily connected, we might still get rid of the supposedly detrimental effects of longevity by killing people at a certain age, while they are still fit. We might consider a ceremony similar to that in the film *Logan's Run*, where everyone participates in a carrousel ritual and is vaporized when they turn 30, except that people would die much later, say, at the age of 80.

It seems that if we really focus on senescence only and disregard the issue of longevity there is very little reason to object to medical interventions in the ageing process. If we had a choice between living a fit life for, say, 80 years and living the same length of time but with the known impairments of old age we encounter now, it seems quite clear what we would choose. However, I want to mention at least a few, if contested, reasons for why we should have second thoughts about eliminating senescence.

Firstly, ageing has certain benefits that would probably disappear if senescence could be cured. Most importantly, people of a certain age are not expected to work for money. The rationale for having a welfare system and pensions is obviously related to the frailties of old age. Secondly, the dependence on others, family members or professional care givers, is not harmful in itself and can, in fact, be a basis for deeper relationships between persons. Thirdly, one would miss a vital experience of being a human, because senescence is a fundamental aspect of living a full human life. Fourthly, old people are much better, especially more efficient, at performing some tasks than younger people because they develop different abilities with age, while admittedly losing some others. If we eliminate senescence, these adaptive mechanisms would be lost. Finally, the value of fully developed or perfected abilities might perish, similarly to the concealment of the value of health without the experience of disease. We might say that we cannot cherish what we cannot lose.

Obviously, all of these potentially positive aspects of senescence can be challenged. My main purpose here is simply to show that the contrasting point of view, which allows for no doubts about the negative sides of ageing, is too strong. So, although the mentioned aspects are, to my mind, good reasons to accept senescence as an important part of human life and to abandon the search for an alleged cure for ageing, I also believe that when the chips are down it can only be an individual evaluation whether and when one finds ageing a burden (cf. [2, p. 147]). It is obvious that several frailties of old age can place a heavy burden on

individuals and there might therefore be good reasons to get rid of them. The desire to live a fitter and possibly a longer life cannot be dismissed by philosophical argument. It depends on what kind of persons we want to be and on our deep value commitments, which are not framed by mere rational reasoning. In liberal societies we cannot tell people how to live their lives if they do not harm others. So, it is up to each of us to decide whether we see a good cause in looking for a treatment for ageing. This result speaks against a duty, which has been suggested by some theorists [25, pp. 661f.; 34], to generally treat ageing processes or find a "cure" for ageing. Surely, a liberal society would allow people who are opposed to senescence to fund their own research. But people who reject the need to find a cure for ageing because they do not see it as a threat to their well-being are surely not irrational.

My conclusion, therefore, is not a sufficient basis for altogether rejecting medical research into senescence by people who want to live a better life on their standards of what a good human life consists in. The improvement of human life can only be considered a collective duty if we know that the results would really constitute an improvement. Whether the elimination of senescence would exemplify such an improvement is a contested matter. I myself hope to get old before I die, because I consider the experience of senescence to be valuable. But there are those who hope they will not grow old, and I appreciate their conviction.

Conclusion

In this paper I have focused on biological ageing, or senescence, in contrast to an interpretation of ageing that is concerned with chronological age. I have defended a point of view that denies ageing a disease status. My argument is based on a theory of disease that has been developed by Christopher Boorse. Ageing, according to this theory, is not a disease because the decline in certain abilities is biologically or statistically normal for human beings. Common ageing processes do not involve dysfunctions. More severe cases of impaired abilities can nevertheless be pathological. I have also discussed some unsuccessful arguments that support the same conclusion. Defenders of the view that ageing is a disease ought not to merely reject these inconclusive arguments. Since they carry the burden of proof, they would also need to reject the particular reasoning I have defended in this paper.

However, I have conceded that ageing might be regarded as disease—or a condition worth treating by medical means—on a normative basis because, e.g., it consists in an impairment of human well-being. I have examined some arguments for why we should not attempt to treat the common results of senescence, though we obviously ought to treat severely disabling and harmful conditions that are related to ageing. Whether we consider ordinary senescence to be harmful and a proper basis for intervention depends on individual value judgments. Some people see senescence as their worst enemy, others see it as a vital part of their life. I do not see a way to conclusively reject either point of view.

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