



Extending Human Lifespan and the Precautionary Paradox

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ABSTRACT

This paper argues that a precautionary approach to scientific progress of the sort advocated by Walter Glannon with respect to life-extending therapies involves both incoherence and irresolvable paradox. This paper demonstrates the incoherence of the precautionary approach in many circumstances and argues that with respect to life-extending therapies we have at present no persuasive reasons for a moratorium on such research.

Keywords: ethics and scientific research, extending life span, precautionary principle

I. INTRODUCTION

In his paper “Extending the human lifespan,” Walter Glannon argues for the modest conclusion that “if one accepts the principles of evolutionary biology, then the possibility I am raising should at least give us pause before we develop and implement life-extending technology on a broad scale.” Glannon’s “possibility” is that he believes there is some reason to suppose that “people could have shorter and more diseased lives owing to a higher incidence of mutations not selected against earlier in life.” Glannon freely admits that research into life extending therapies might lead to treatments for many existing diseases but it is clear that he firmly believes the dangers far outweigh the benefits and that the pause he recommends will be a very long one.

There is a deep problem here about the interpretation of the precautionary principle that is at the heart of the many justifications for the “pause” that

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Glannon urges. First we must be clear that it is in fact a version of the precautionary principle that is chiefly in play in Glannon's espousal of a long pause to freedom from the ravages of the diseases of old age.

Towards the end of his paper, Glannon further glosses his espousal of the "pleiotropic gene hypothesis":

On this view many genes have alleles that either cause or predispose human organisms to one disease at the same time that they protect them against a different disease. The most well-known example of this is the allele for the autosomal recessive disease sickle cell anemia. One copy of the allele will protect against malaria, though two copies of the allele will cause sickle cell disease (p. 348).

Glannon's point is that "natural selection allows the expression of the allele causing the more chronic genetic condition because it protects against the more acutely life threatening pathogen predominant in a given environment. This yields a net reproductive advantage to human organisms by allowing them to remain healthy and survive in different environments until they reach reproductive age." Glannon clearly believes that we should not forego the genetic advantage conferred by the sickle cell allele by attempting to remove it in order to prevent sickle cell disease (see Glannon, 2002a; Harris, 2002). The precautionary principle is thus invoked – the dangers of attempts to prevent sickle cell disease by genetic manipulation should "give us pause". But during this pause thousands will continue to die of sickle cell disease, the caution which should give us pause causes harm which we should pause before permitting to occur. This we may call "the paradox of precaution". How is this precautionary paradox to be resolved?

II. THROWING CAUTION TO THE WINDS

The so-called "precautionary principle" (PP) invoked by Glannon is fast becoming one of the most widely used and widely respected principles in applied ethics and policy. It has gained currency in recent discussions about environmental protection, genetic manipulation, and public health (see Comba, Forastiere, & Settimi, 1996; Davis, Axelrod, Bailey, Gaynor, & Sasco, 1998; Report of the Committee on the Ethics of Gene Therapy, 1992; Wainwright, 1998), three of the most important contemporary areas of public concern about the impact of science on society. Almost unnoticed, however,

has been the fundamental threat that the increasing popularity of the PP poses for scientific advance and technological progress. The PP inexorably requires science to be ultra-conservative and irrationally cautious and societies to reject a wide spectrum of possible benefits from scientific advance and technological change. Thus unlike many moral principles that have found their way into the field of social policy and have found expression in contemporary protocols, regulations, and even treaties and laws, the PP has immense potential for good or ill. Both as used by Glannon and more generally, the PP is an invalid principle for rational decision-making and untenable as a moral principle.

The Origins of the Precautionary Principle

The precautionary principle can be traced back to the German concept of “*Vorsorgeprinzip*,” which places a duty on government to use foresight and prevent environmental dangers and risks (Douma, 1996; Sands, 1994). From the German context it entered the international debate in the 1980s where the first mentions of precaution began to appear in discussions of international environmental treaties (Boehmer-Christiansen, 1994; Douma, 1996). From these perhaps modest beginnings, it has moved into discussions about genetically modified organisms, public health, and health systems research.

The PP first entered the text of an international convention in the 1985 Vienna Convention for the Protection of the Ozone Layer, and was explicitly stated and unanimously endorsed in the 1992 Rio Declaration on Environment and Development where principle 15 states that:

In order to protect the environment, the precautionary approach shall be widely applied to States according to their capabilities. Where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measure to prevent environmental degradation (Rio Declaration on Environment and Development, 1992).

Similar wordings can be found in the 1992 Biodiversity Convention and the 1992 Climate Change Convention (cf., Douma, 1996; Sands 1994). The PP has also been mentioned with approval in a minority opinion drafted by 8 of the 20 judges of the European Court of Human Rights deciding the case of *Balmer-Schafroth and Others v. Switzerland* (67/1996/686/876) in 1997, which concerned the building of a nuclear power station.

At the European level the most prominent use of the PP is, however, in the present consolidated version of The Treaty Establishing the European

Community (as amended by the Treaty of Amsterdam), where article 174 (ex Article 130r) states: “2. Community policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Community. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay” (Consolidated Version of the Treaty Establishing the European Community).

What Does the Precautionary Principle Mean?

Proponents of the PP from more than 30 universities and government agencies issued the Wingspread Statement on the Precautionary principle in 1998, which explains the PP as follows:

When an activity raises threats of harm to human health or the environment precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. . . . In this context the proponent of an activity, rather than the public, should bear the burden of proof (Ashford et al., 1998).

It is obvious that the PP does not have one universally agreed-upon canonical formulation. An initial approximation to the core content of the PP could, however, be the following, which we believe, would be accepted by most PP proponents including Glannon:

PP: When an activity raises threats of serious or irreversible harm to human health or the environment, precautionary measures which effectively prevent the possibility of harm (e.g., moratorium, prohibition, etc.) shall be taken even if the causal link between the activity and the possible harm has not been proven or the causal link is weak and the harm is unlikely to occur.

As a corollary to this, some argue that the following principle about the burden of proof (PBP) also holds:

PBP: In contexts where the PP can be invoked, it falls on the proponent of the activity to prove that it is safe.

It is important to note that this version of the PP is fairly weak. If we can show that this weak formulation is untenable, we will *a fortiori* have shown that any stronger formulation is untenable.

The Precautionary Principle and Rational Choice

One way of understanding the PP would be as a principle of rational choice. This would involve the claim that in circumstances in which decisions must be made and where the PP could be applied, it would be rational to apply it and follow the conclusions drawn from such an application. There are, however, some problems with the PP as a principle of rational choice.

The first problem is inherent in the specification of the harm, which is to be avoided by precautionary measures. The mere fact that a harm is irreversible does not entail that it is serious in any way. If somebody without permission were to place a 1 mm long ineradicable scar on the sole of someone else's foot, the "victim" would have been irreversibly harmed, but it would be difficult to claim that she had been seriously harmed. It is also the case that many harms are irreversible, without thereby being irremediable. If you block your neighbour's driveway so that he has to take a taxi to work on a specific day, the harm you have done is irreversible (because time is irreversible), but it is not irremediable. If you pay for the taxi and compensate your neighbour to his satisfaction, the harm has arguably been remedied. That a harm is irreversible does therefore not in itself tell us anything about the weight we should give to this harm in our rational decision-making, and mere irreversibility of harm can therefore not sustain any version of the PP. Similarly, the mere fact that a harm is serious is also, in some cases, insufficient to show that it must be prevented, for example, when the harm though serious is fully reversible or fully remediable.

Modified Precaution

If the PP is valid at all, it can therefore only be valid in cases where there is risk of a harm which is "Serious *and* both irreversible and irremediable." We thereby get the modified PP1:

PP1: When an activity raises threats of serious and both irreversible and irremediable harm to human health or the environment, precautionary measures which effectively prevent the possibility of harm (e.g., moratorium, prohibition etc.) shall be taken even if the causal link between the activity and the possible harm has not been proven or the causal link is weak and the harm is unlikely to occur.

In the context of human health, we need to know whether it is sufficient and/or necessary for a harm to be "serious" that it will seriously affect the health of one person, or whether it is sufficient and/or necessary that the aggregate

harm to a group of people adds up to being “serious”, or is it some combination of these options. Depending on what definition of “serious” one chooses, very different activities are marked out as falling under the PP (i.e., as being PP-serious).

If, on the one hand, a serious effect on one person is sufficient for something to be PP-serious, then the PP entails that the inventor of apple pie should have applied the PP, and let the first pie be the last, since there have been people who have choked on apple pie. If, contrariwise, a combined serious effect on health is sufficient for PP-seriousness, then the PP clearly rules out any further procreative acts resulting in pregnancy and childbirth. And if, finally, it is sufficient that a harm is serious either at the individual or the group level, then the PP seems to rule out both motherhood and apple pie.

Epistemology and Choice

Within the context of rational choice, the PP could be either an epistemic rule or a rule of choice. The epistemic PP rule would state that:

E-PP: When an activity raises threats of serious and both irreversible and irremediable harm to human health or the environment, any evidence suggesting a causal link between the activity and the possible harm shall be given (much) greater weight, and the probability of that harm’s occurring shall be assumed to be much higher than it would in other circumstances.

According to the E-PP, it is not our final way of choosing that is different in contexts where the PP applies, but the difference lies in how we should weigh various pieces of evidence. It is only on the E-PP interpretation that the PBP can be a reasonable corollary to the PP. The PP rule of choice would state that:

C-PP: When an activity raises (credible) threats of serious and both irreversible and irremediable harm to human health or the environment, precautionary measures shall be taken.

The E-PP is still vague as to how much greater weight evidence pointing to a causal link or to the probability of the adverse event’s occurrence should be given in a PP relevant context. So we will begin by looking at the strongest possible interpretation, i.e., the interpretation suggested by the PBP, that a given activity should be shown not to be PP-serious, before it is allowed. What is asked for here is thus a proof of non-harmfulness. Now, it is a commonplace in the philosophy of science, that it is logically impossible to demonstrate the

truth of general sentences, unless all instances falling under the general sentence are known. For example, the claim that “all ravens are black” can only be proven if we actually are able to establish the colour of each and every raven. In the PP context, the relevant general sentence is of the form “Activity A will in no future instance where it is performed cause effect E which is PP-serious.” Such a sentence can never be proven, since it is concerned with future instances, which we cannot now identify. Asking for proof of non-harmfulness is therefore incoherent.

Weaker Versions of the PP

This entails that only weaker versions of E-PP stand any chance of being valid. The weaker versions of E-PP all belong to a graded family of epistemic rules stating that:

WE-PP: When an activity raises threats of serious and both irreversible and irremediable harm to human health or the environment, any evidence suggesting a causal link between the activity and the possible harm shall be given a X ($X > 1$) times greater weight than it would in other circumstances [where X is a metric of epistemic weight ($X = 1$ being neutral balancing of evidence)].¹

Explicating the weaker versions of E-PP in this way immediately points to a problem. We have shown above that the version of the E-PP requiring proof of non-harmfulness is incoherent, so the epistemic task before us is no longer one of seeking proof, but one of seeking rational justified belief about the possible harmfulness of the activity in question. The only sensible way of achieving such rational justified belief is by gathering the available evidence, maybe producing more evidence if crucial parts are missing, and then weighing any conflicting pieces of evidence against each other (if there is no conflicting evidence we have a special, simple case). The weight to be given to each piece of evidence is ordinarily believed to be a function of its epistemic warrant (i.e., the degree to which we have good reasons for believing this piece of evidence (this could be expanded technically but the expansion is irrelevant here)). What the WE-PP instructs us to do is to change this normal balancing of evidence by giving evidence pointing in one direction more importance than evidence pointing in the other direction, even if both pieces of evidence have the same epistemic warrant (they could for instance be two independent conclusions of one and the same research project). It may be rational to have epistemic rules that require a certain threshold of justification for a belief before we act on it in special circumstances, or rules that instruct us always to

resolve ties in justification in a specific way (for instance in court cases). However, it is difficult to imagine any justification for an epistemic rule requiring a systematic discounting of evidence pointing in one direction, but not in the other. Such systematic discounting would systematically distort our beliefs about the world, and would necessarily, over time, lead us to include a large number of false beliefs in our belief system. The WE-PP is therefore invalid, and since we have previously shown the stronger version of the E-PP to be meaningless, this shows that the E-PP as such is invalid.

Decision Rules

But, as we pointed out above, the PP could also be a rule of choice, and even if the E-PP is invalid, the C-PP might be valid. It is, however, fairly simple to show that this is not the case. First, accepting the C-PP will leave us paralyzed. If we, for instance, look at the case of genetically modified plants (GM-plants), there is no doubt that the largest amount of uncertainty about their possible harmfulness to the environment and/or to human beings existed at the time when nobody had yet produced a GM-plant. There were theoretical models showing that harm might occur, but for very obvious reasons no empirical data to back up or dispute these models. The C-PP would have instructed us not to proceed any further and perhaps even to stop people thinking about going further (this may in some circumstances be a necessary precautionary measure!), and the data to show whether or not the theoretical risks are real risks would never have been produced. The same is, of course, true for every subsequent step in the process of introducing GM-plants. The C-PP will tell us not to proceed any further, simply because there is some threat of harm which cannot be conclusively ruled out based on evidence from the preceding step in the process. The C-PP will thus block the development of any technology or human activity where there is just the slightest theoretical possibility of harm.

Looking at the process from the other direction, this leads to an infinite regress of precaution. Before I start commercial growing of GM-plants, it seems rational to perform large-scale experiments to show, for example, whether the genes may spread to other plants. Such experiments are, however, ruled out by the C-PP, which also rules out small-scale experiments, which also rules out the growing of plants in laboratories, which also rules out . . . etc. etc.

Second, the C-PP can be understood as advocating an extreme degree of risk-aversivity. Risk-aversivity is not necessarily irrational. It can be very

rational to include a safety factor in our decision-making, but the C-PP requires us to use an infinite safety-factor, and that is undoubtedly irrational in most, if not all, cases. The C-PP can therefore not be a valid rational decision rule.

Logical and Real Possibilities

What underlies the attractiveness of the PP in its many forms is, perhaps, a conflation of the concept of logical possibility and our ordinary concept of possibility. Every event which does not entail a logical contradiction is logically possible (or as philosophers sometimes put it, there is a possible world in which it is instantiated), but there are many logically possible events which are not possible in the present world. It is logically possible for pigs to fly (i.e., it entails no logical contradiction), but it is clearly not possible in the everyday sense of the word (i.e., there may be a world where the event can happen, but it is not the one we inhabit). What the PP asks us to do is to suspend this distinction when it comes to possibility of certain kinds of harm, and act as if the mere fact that they are logically possible also means that they are not only possible, but even likely to occur.

III. THE PRECAUTIONARY PRINCIPLE AS A MORAL PRINCIPLE

In the preceding sections, we have shown that the PP is an invalid principle of rational choice even if modified as in PP1. But could it instead be a moral principle? It is important to note that if the PP is a moral principle, then it must belong within the broad family of consequentialist ethics, since it primarily refers to the consequences of a certain action (i.e., introducing the activity in question). It does not refer to the act in itself being wrong or to the motives, character or virtue of the actor(s).² Now the PP obviously does not belong within the mainstream maximizing tradition of consequentialism, but that does not *a priori* rule it out as a valid moral principle. If the PP is a moral principle, it has the form:

M-PP1: When an activity raises threats of serious and both irreversible and irremediable harm to human health or the environment, the morally right action is to take precautionary measures which effectively prevent the possibility of harm (e.g., moratorium, prohibition, etc.) even if the causal link between the activity and the possible harm has not been proven, or the causal link is weak and the harm is unlikely to occur.

It is difficult to prove conclusively that there could not be such a moral principle, but as we have already discussed, if the M-PP1 is a valid moral principle it must be valid within some non-maximizing form of consequentialism. There are, however, some considerations which indicate that if the M-PP1 is a moral principle, then it is (1) a moral principle that does not fit into any of the recognized forms of consequentialism current today, and (2) a principle that would only be applicable to a very limited range of cases. In some ways, the M-PP1 can be seen as a partial principle of negative utilitarianism. According to negative utilitarianism, the rightness of an act depends on whether or not the act is the act that, among all the available acts, does most to decrease suffering. The main principle of negative utilitarianism is thus not: “maximize utility”, but “minimize disutility”. It thus shares the feature of the M-PP1 that we should disregard positive benefits in our moral considerations and focus on whether or not our actions are likely to cause harm. Although negative utilitarianism has been defended by a number of philosophers, including Karl Popper, it has today been largely abandoned because it suffers from two major weaknesses. The first is that the easiest way to remove all suffering is to remove all beings capable of suffering, and the second that there seems to be no good arguments for using a value scale in moral thinking that only takes account of negative values (unless, of course, one wishes totally to deny the positive value of preference satisfaction or happiness). The M-PP1 does not share the first weakness of negative utilitarianism because it is only concerned with certain types of harm³ reduction, but it does share the second weakness. In the M-PP1, this second weakness of negative utilitarianism is compounded by the aberrant way in which the PP tells us to take consequences into account. Since we are acting within a context of uncertainty, the standard way of minimizing harm would be to act in a way that minimizes expected harm by calculating the product of the likelihood of harm and the magnitude of harm for each possible action, and then choosing the action having the least expected harm. However, within the range of harms where the M-PP1 is applicable (see the discussion of PP-seriousness above), the M-PP1 tells us not to try to minimize harms, but simply to abjure any action that has any possibility of a PP-serious outcome. What we end up with is thus not just a value scale that only takes account of negative values, but also a value scale where only negative outcomes below a certain level of negativity (those outcomes that are PP-serious) are counted. The M-PP1 thus truncates the scope of our moral considerations even more than negative utilitarianism.

Another possible attempt of fitting the M-PP1 into a theoretical framework would see it as a lower level principle in some form of indirect consequentialism. Indirect consequentialism has become the most popular form of consequentialist theory today (Petit, 1991), since it does not demand that the individual agent should perform the full calculation of consequences prior to each and every act, but allows the agent to rely on moral rules of thumb or moral principles. It is only in cases of conflict between such rules of thumb, or in cases where major decisions have to be made, that the agent has to specify consequences and estimate probabilities connected to the different possible acts. This already indicates that it will be very difficult to give a convincing argument for the inclusion of M-PP1 in an indirect consequentialist theory. First, M-PP1 is explicitly concerned with acts having serious consequences (albeit PP-serious). Second, M-PP1 is directed at situations where there are not stringent limits on the time available for ethical consideration, i.e., it is not usually the case that the agents involved do not have time to perform the full consequentialist calculus.

Now there could still be a valid application of the M-PP1 in more mainstream moral theory, but this would be a very limited application where the harm to be avoided is of a very special character. What the M-PP1 enjoins us to do is to disregard any possible positive consequences of a given activity, and only look at the possible negative consequences. We are to disregard the good we may do and the other harms we might avoid, and let our moral decision-making concentrate on the possible harm (note again, not the evil act but the evil outcome). Here the bad outcome would have to be so very bad that it would be highly improbable that it could be outweighed by any good consequences. Or, the possible bad outcome would have to be of a kind which could not be outweighed by any good consequences. Examples (if there are any) would be things that are forbidden "whatever the consequences" (Bennett, 1966; Jonas, 1984). However, a full discussion is outside of the scope of the present paper. Most circumstances in which the PP is invoked involve possible harms that are not even remotely of an order of magnitude that could not be outweighed by possible benefits. In these circumstances, the M-PP1 is clearly not a valid moral principle.

IV. WHITHER CAUTION?

One final very general problem is that the PP is often invoked in circumstances in which it is far from clear in which direction (if any) caution lies. Two

examples here are particularly apposite. Discussions of the ethics of genetic manipulation or of human reproductive cloning are bedevilled by appeals to the sanctity of the human gene pool or to the importance of preserving the genetic inheritance of humankind. UNESCO's International Bioethics Committee (IBC), for example, reflecting on the ethics of scientific progress, has maintained that "the human genome must be preserved as common heritage of humanity" (UNESCO, 1997; see also UNESCO Press Release No. 97-29). This is clearly a covert appeal to PP. The idea is that human evolution, which is responsible for the human genome "as the common heritage of humanity," has done well for us and is likely to continue so to do. Therefore, any proposed changes are to be considered of uncertain consequence and probably disastrous. The PP in any of its versions therefore applies, and requires that we leave well enough alone. A number of questionable assumptions are involved here. The first is that our present point in evolution is unambiguously good and not susceptible of improvement. Second, it is assumed that the course of evolution, if left alone, will continue to improve things for humankind or at least not make them worse. The incompatibility of these two assumptions is seldom noticed. However, the common heritage of humanity is a result of evolutionary change. Unless we can compare the future progress of evolution uncontaminated by manipulation of the human genome with its progress influenced any proposed genetic manipulations, we cannot know which would be best and hence where precaution lies.

The second is, of course, Walter Glannon's arguments with which this discussion began. Glannon states quite reasonably "in the scenario I have presented, the probability and magnitude of harm to distant future generations might not be enough to morally outweigh the probability and magnitude of benefits to present and near future generations [in moderately extended life spans] . . . But the distant harm would morally outweigh the near benefit in a substantially extended life span" (p. 351). The problem is that we simply do not know whether this will be true or not. Glannon clearly believes that it will because he says the distant harm "would involve a more radical alteration of natural selection and in turn would entail a higher incidence of mutations in the human gene pool which would have a more adverse impact on the health of generations in the further future" (p. 351). Here, however, he has abandoned his cautious use of terms like "might" and "possibly" and delivers his verdict with categorical assurance. In order to make the caution Glannon urges rational, we need far clearer evidence of the balance of harms and benefits than is at present available. We also need to make very pessimistic

assumptions about what measures will be available in the “far future” to neutralize the possible bad effects of a policy that will, by hypothesis, do substantial good in the present and near future. Of course, if, as Glannon clearly believes, life-extending therapies won’t even do good and will in fact prove harmful in the near future, then *that* is a sufficient reason for not utilizing them and the precautionary principle has no role to play.

NOTES

1. There could also be an additive family of epistemic rules stating that “When an activity raises threats of serious and both irreversible and irremediable harm to human health or the environment, any evidence suggesting a causal link between the activity and the possible harm shall be given an additional epistemic weight of $X (X > 0)$ ”. The argument presented in the article is equally valid for such an additive rule.
2. Proponents of the PP often do put forward views about the motives of commercial agents, but these views are unconnected to the PP.
3. Applying the M-PP1 may actually in most instances not reduce the net amount of suffering in the world.

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