A Constructivist Solution to the Problem of Induction

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ABSTRACT: Ever since Hume raised the problem of induction, many philosophers have tried to solve this problem; however, there still is no solution that has won wide acceptance among philosophers. According to Wilfrid Sellars, the reason is mainly that these philosophers have tried to justify induction by theoretical reasoning rather than by practical reasoning. In this paper I offer a sort of Sellarsian proposal. On the basis of the instrumental principle and the constructivist view of the concept of epistemic justification, I argue that it is reasonable to accept induction.

RÉSUMÉ: Depuis que Hume a soulevé le problème de l'induction, nombreux ont été les philosophes qui se sont attaqués à cette question. Aucun, pourtant, n'y a jusqu'à présent apporté de réponse satisfaisante et susceptible d'entraîner l'adhésion générale. Selon Wilfrid Sellars, la raison de cet échec est que les tentatives de justification se fondaient sur des raisonnements théoriques plutôt que pratiques. L'auteur offre ici une sorte de solution «sellarsienne» au problème. À partir du principe instrumental et de la conception constructiviste de la justification épistémique, l'auteur tente de démontrer qu'il est raisonnable d'accepter l'induction.

1. Preliminary Remarks

We have used inductive inference in order to predict the future on the basis of past experience. In particular, natural science has made "remarkable successes" by way of inductive inference. David Hume claims, however, that we cannot rationally justify inductive inference. His point is straightforward. In the first place, no deductive demonstration is possible for inductive inference, for an

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inductive conclusion is an assertion of a matter of fact whose denial is non-contradictory.[1] In the second place, we cannot justify inductive inference by inductive inference, for no procedure is self-justifying.[2]

Ever since Hume raised this problem of induction, many philosophers have tried to solve this problem. Yet there still is no solution that has won wide acceptance among philosophers. Thus, as C. D. Broad aptly puts it, induction is "the glory of science and the scandal of philosophy."[3] Why then is it that the painstaking efforts of those many philosophers over the course of more than two hundred and fifty years have been fruitless? According to Wilfrid Sellars, the reason is mainly that these philosophers have tried to justify induction by theoretical reasoning rather than by practical reasoning. I fully agree with this diagnosis. Unfortunately, however, Sellars's diagnosis and his proposal have failed to win the wide acceptance that they deserve. Thus, in this paper I shall offer a sort of Sellarsian solution to the problem of induction. On the basis of both the instrumental principle and the constructivist view of the concept of epistemic justification, I shall argue that it is reasonable to accept inductively supported conclusions. In addition, I shall argue that my constructivist view helps us meet the sceptical challenge.

2. The Instrumental Principle

As mentioned above, I shall use, in part, the instrumental principle in order to solve the problem of induction. Thus let me briefly discuss the instrumental principle I shall use.

I shall realize goal G.
M is the only means to G.[4]
∴ I shall take M.

Practical arguments are those that have practical commitments as their conclusions. In the above argument, the conclusion "I shall take M" expresses the subject's intention to take means M. We may conceive forming such an intention as undertaking a practical commitment. Thus we may take it that the conclusion expresses the subject's practical commitment to taking means M. Such expressions of intention (or practical commitment) are neither true nor false. Yet, under normal circumstances and barring a change of mind, one's intention to do something brings about one's doing it. Therefore, the above argument is a practical argument.

An agent, S, can *express* his intention to do A by saying "I shall do A." And we may *describe* such an intention by saying "S intends to do A." Thus we may also express the instrumental principle in the following form:

S intends to realize goal G.
M is the only means to G.
∴ S intends to take M.

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Since, as mentioned above, we may conceive S's forming an intention as his undertaking a practical commitment, we may also express the instrumental principle as follows:

S is committed to realizing goal G.
M is the only means to G.
∴ S is committed to taking M.

What then justifies the above principle? Suppose that S is committed to realizing goal G. To say that S is committed to realizing G is to say that S is committed to taking an appropriate means to G. Suppose also that S takes M to be the only means to G. Now, under the condition that nothing prevents S from taking M, if S avoids taking M, then we cannot take it that S is really committed to realizing G.[5] To put it another way, under the condition that nothing prevents S from taking M, if S avoids taking M, it is either because S does not take M to be an appropriate means to G or because S is not really committed to realizing G. Therefore, if S is committed to realizing G, and if S takes M to be the only means to G, then S must be committed to taking M. For example, if S is committed to quenching his thirst, and if he takes drinking water to be the only means of quenching his thirst, he must be committed to drinking water. In this sense, the above instrumental principle is valid.

One point that should be noted here is that the instrumental principle by itself does not justify goals because it is about means-goals relations.[6] As Nicholas Rescher aptly puts it, "A voyage to a foolish destination—no matter how efficiently conducted—is a foolish enterprise."[7] Thus, even if M is the most effective means to G, it may be unreasonable to take M in case G is an unreasonable goal. Therefore, we need to distinguish two kinds of rationality (or reasonableness). One is instrumental rationality. It tells us what to do to effectively achieve one's goal, but it does not tell us what to adopt regarding goals. Thus we must reason not only about matters of efficiency of goal attainment, but also about the appropriateness of our goals.[8] To put it another way, making a practical commitment to a goal is one thing, and being reasonable to make such a commitment is another. In short, it is reasonable for us to take means M only if M is a means to a *reasonable* goal. Therefore, the following normative argument holds:

It is reasonable for us to realize goal G.
M is the only means to G.
∴ It is reasonable for us to take M.[9]

What then are *reasonable* goals? As Rescher points out, "[T]he crucial question for rationality is not that of what we prefer, but that of what is in our best interests—not simply what we happen to desire, but what is good for us in the

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sense of contributing to the realization of our real interests."[10] Since our welfare (or well-being) is vital to our real interests, we may say that our welfare is a reasonable goal for us. For this reason, we may also say that it is reasonable for us to act so as to promote our welfare, whereas it is unreasonable for us to act so as to threaten our welfare. Hence, if a person's life is put into danger unless she quenches her thirst shortly, and if drinking water is the only means of quenching her thirst in the present circumstances, it is reasonable for her to drink water in the present circumstances. I shall say more on reasonable goals in the next section.

3. The Constructivist View of the Concept of Epistemic Justification

In her recent book *The Constitution of Agency: Essays on Practical Reason and Moral Psychology*, Christine M. Korsgaard defends the so-called "constructivist view" of ethical concepts. There are two approaches to understanding the function of concepts. According to the realist approach, the main function of concepts is to describe or mark out the things we encounter in the world. For example, we use the concept of dog to denote dogs we find in the world. Unlike descriptive concepts such as *dog* and *stone*, however, this realist approach might not be suitable for *normative* concepts such as *good* and *bad*. According to the constructivist approach, the function of at least some concepts is not to describe the world, but rather to mark out the solutions to some practical problems we face. Korsgaard claims that we should take this constructivist approach to our ethical concepts because the main function of ethical concepts is not to describe things in the world, but to change human actions so as to achieve some practical goals we have. She says:

> [M]oral philosophy as conceived by constructivism is a practical enterprise, an enterprise of working out the solutions to problems, not a mysteriously non-empirical theoretical enterprise aimed at identifying normative facts that are somehow part of the external world.[11]

What sort of practical problems are then addressed by ethical concepts? Above all, let us consider what Thomas Hobbes calls "the state of nature," in which there are no ethical norms and no commonly accepted mechanism for enforcing them, so that each of us is free to do anything as we please, even to take away the property and life of others. According to Hobbes, such a state of nature is bound to be the constant state of "war of every man against every man," so that life in the state of nature would be intolerable.[12] In order for us to escape from the state of nature and lead a life without fear of attack, theft, or treachery, we need ethical norms to govern our relations with one another. For example, a person who harms another person for no good reason must be punished for doing something bad (or violating an ethical norm). For this reason, we have ethical concepts such as *good* and *bad* in order to deal with the practical problem of how we are to escape from the state of nature and

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enjoy the benefits of communal life; and the concept of goodness names whatever solves this sort of practical problem. Likewise, we have the concept of justice, not because justice is something we have found in the world, but because we face the practical problem of how we are to distribute the benefits and burdens of social co-operation; and the concept of justice names whatever solves this sort of practical problem.[13] To put it another way, we can realize justice by distributing the burdens and benefits of social co-operation in such a way that everyone gets a fair share in proportion to his or her burdens.

The concept of ethical justification is a *normative* concept. Actions are ethically justified when they are in accordance with ethical norms, and so we ought to act in accordance with ethical norms. And we adopt ethical norms for the sake of realizing our ethical goal, which is to escape from the state of nature and enjoy the benefits of communal life. Thus ethical norms are our means to the ethical goal, and so ethical norms are *correct* just in case they are conducive to the ethical goal. In short, the concept of ethical justification depends on ethical norms, which in turn depend on the ethical goal. For this reason, we may say that the concept of ethical justification is a *goal-dependent* concept.

The important question now is this: By virtue of what is it that ethical norms have their normative force for us? Let us begin by considering an organization where all members are subject to the regulations of the organization. If one becomes a member of such an organization, one is thereby bound by its regulations. For example, if a man becomes a police officer, he is thereby bound by the police regulations. Thus, insofar as an agent participates in an organization as a member, the regulations of the organization have their normative force for him or her. In a similar vein, we may say that insofar as each of us participates in a community as a member, where all members are equally subject to ethical norms, ethical norms have their normative force for us. Let me elaborate a bit further.

As mentioned above, our ethical problem or goal is to escape from the state of nature and enjoy the benefits of communal life. To deal with this problem, we constitute a community where all members are equally subject to ethical norms. The reason is straightforward. We take our ethical problem to be a real problem we have to deal with, and we need ethical norms to govern our relations with one another, insofar as we live in a community for the sake of solving this real problem. In a similar vein, Sellars claims that "it is a conceptual fact that people constitute a community, a *we*, by virtue of thinking of each other as *one of us*, and by willing the common good *not* under the species of benevolence—but by willing it as one of us, or from a moral point of view"(emphasis Sellers's).[14] Besides, from a moral point of view, there are no membership restrictions. Any rational being can be a member of our ethical community if he or she is willing to be a part of the community where all members are equally bound by ethical norms.[15] Due to these reasons, if each of us participates in a

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community as one of us, each of us is thereby bound by ethical norms. If we did not take the ethical goal to be reasonable, we would not need to constitute a community from the beginning. Thus, insofar as each of us participates in a community as one of us, we should take our ethical goal to be reasonable. In addition, as mentioned above, ethical norms depend on the ethical goal. Thus if our ethical goal were unreasonable, there would be no basis on which to evaluate ethical norms as correct or incorrect. For this reason, the normative force of ethical norms depends on the reasonableness of our ethical goal. Hence, since we should take our ethical goal to be reasonable insofar as each of us participates in a community as one of us, ethical norms have their normative force for us by virtue of the fact that each of us participates in a community as one of us.

Now, I claim that the above constructivist view of normative concepts is also true of the concept of *epistemic justification*. On my view, the concept of epistemic justification is *goal-dependent* in such a way that the coherence of this concept depends on the reasonableness of our epistemic goal. To begin with, what is our epistemic goal? The ultimate epistemic goal is to know the truth and to avoid error. But even though we have very strong evidence for some proposition, p, we cannot exclude the possibility that p might turn out to be false. We are fallible beings, after all. Thus, what we should seek instead is to accept beliefs which are truth-conducive, and to not accept beliefs which are not truth-conducive. We have epistemic norms such as "one ought to believe things on the basis of evidence" because we intend to realize this sort of epistemic goal. In other words, epistemic norms are our means to the epistemic goal of acquiring truth-conducive beliefs about the world, and so epistemic norms are *correct* just in case they are conducive to this epistemic goal. In addition, we evaluate beliefs as justified or not on the basis of epistemic norms; that is, beliefs are epistemically justified just in case they are in accordance with epistemic norms, and so we ought to hold beliefs in accordance with epistemic norms. In this sense, the concept of epistemic justification is a normative concept.

Due to the above reasons, the concept of epistemic justification depends on epistemic norms, which in turn depend on the epistemic goal of acquiring truth-conducive beliefs about the world. This epistemic goal seems to be reasonable. As pointed out above, people constitute a community for the sake of promoting our general welfare. Our general welfare will be in jeopardy if we do not know of the dangers and risks in the world. Thus, correct information about the world is of the utmost importance in order for us to make rational decisions for the sake of our general welfare. For this reason, our acquiring correct information about the world will be vital to our general welfare, at least in the long run. Therefore, it is reasonable for us to acquire correct information in such a way that the risk of getting incorrect information is reduced. In other words, it is reasonable for us to acquire truth-conducive beliefs about the world.

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The above claim is also strengthened by the fact that the unreasonableness of our epistemic goal would make the concept of epistemic justification incoherent. Epistemic norms are the means to our epistemic goal. Thus, if our epistemic goal were unreasonable, there would be no basis on which to evaluate epistemic norms as correct or incorrect. If there were no correct epistemic norms in accordance with which we are to evaluate beliefs as justified or not, then the concept of epistemic justification would be incoherent because there would be no correctness conditions for the concept of epistemic justification. Hence, if our epistemic goal were unreasonable, then the concept of epistemic justification would be incoherent. To put it another way, the coherence of the concept of epistemic justification presupposes that our epistemic goal is reasonable.

If our epistemic goal is reasonable, it is reasonable for us to realize it, unless it is overridden by a more reasonable goal. It is reasonable for us to realize our epistemic goal only if this goal is realizable. As Immanuel Kant insists, "ought" implies "can." Besides, committing ourselves to realizing what cannot be realized is simply wasting our valuable time and efforts. Therefore, we may say that the concept of epistemic justification presupposes that we can, at least in principle, acquire truth-conducive beliefs about the world.

4. The Constructivist Solution to the Problem of Induction

Now consider the following argument:

(P_1) It is reasonable for us to realize our epistemic goal of predicting and explaining the world.
(P_2) Induction is the only means to the above epistemic goal.
(C) ∴ It is reasonable for us to accept induction.

Above all, the above argument is valid because it is an instance of the normative argument mentioned in section 2. Thus we can defend C if we can defend both P_1 and P_2.

Let us begin with P_2. It is indisputable that induction is indispensable in predicting the future (if possible). Hans Reichenbach writes:

> Inductive inference cannot be dispensed with because we need it for the purpose of action. To deem the inductive assumption unworthy of the assent of a philosopher, to keep a distinguished reserve, and to meet with a condescending smile the attempts of other people to bridge the gap between experience and prediction is cheap self-deceit; at the very moment when the apostles of such a higher philosophy leave the field of theoretical discussion and pass to the simplest actions of daily life, they follow the inductive principle as surely as does every earth-bound mind. In any action there are various means to the realization of our aim; we have to make a choice, and we decide in accordance with the inductive principle. Although there is no means which will produce with certainty the desired effect, we do not leave the choice to chance but prefer the means indicated by the principle of induction.[16]

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We have no choice but to use ampliative inference in order to predict the future on the basis of past experience. Inductive inference is indeed such ampliative inference. Therefore, if we have an appropriate means of predicting the future, it can be nothing other than inductive inference.[17]

In addition, if we accept induction, we can explain the past. Let us take an example:

> All emeralds observed so far have been green.
> ∴ (Probably) all emeralds are green.

We intend to explain why all observed emeralds have been green. We also intend to predict that we will continue to observe only green emeralds in the future. We can achieve this goal if we accept the inductively supported conclusion above. In the first place, we did not observe any non-green emerald because all emeralds are green. In the second place, we will not observe any non-green emerald in the future because all emeralds are green. Hence, if we accept inductively supported conclusions, we can have our intended explanatory and predictive power.

Let us now turn to P_1. According to Sellars, the ultimate foundation of scientific knowledge is the intentions of the scientific community. Scientists intend to make predictions and also give explanations regarding what has been observed. To put it another way, on Sellars's view, inductive reasoning is goal-oriented, and the specific goal here is an explanatorily coherent theory. The question now is why this goal is reasonable. According to Sellars's version of explanationism, as Joseph Pitt puts it, "[W]e are justified in accepting a theory if it *explains*, a description if it *is explained*, and a rule of inference if it *helps to explain*" (emphasis Pitt's).[18] Why then is this explanationist principle of justification reasonable? Pitt says:

> Sellars requires the rationality of the inductive mode of inference. The vindication of this presupposition is the completion of the final theory whose explanatory capacity will justify the initial acceptance of the general policy of postulating unobservables to explain observables. This is merely another conditional argument. And the continued 'iffy' nature of the explanationist enterprise raises serious doubts about the viability of the general program.[19]

There is some indication, however, that Sellars defends his explanationist framework as a means to our general welfare. For he says as follows:

> [T]he prime mover of the practical reasoning involved in probabilistic thinking, indeed all logically oriented thinking, 'deductive' as well as 'inductive', 'practical' as well as 'theoretical', is not an idiosyncratic *wish* to promote truth, but the intention *as a member of a community* to promote the total welfare of that community. This intention is implicit, and, when it becomes explicit, can be overcome by impulse and

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> self-interest. But it is because truth is a necessary condition of securing the common good that the search for it presents itself to us, on reflection, as categorically reasonable—in the truest sense a moral obligation (emphasis Sellars's).[20]

Thus, on Sellars's view, it is categorically reasonable for us to promote the common good (that is, our general welfare), and truth is a necessary condition for securing the common good, and hence it is categorically reasonable for us to promote our epistemic goal. This claim might still be vulnerable to the sceptical objection, however. For example, Willem A. deVries objects as follows:

> Sellars argues that the we-intention to promote our welfare is categorically reasonable, but seems to assume that what would, indeed, promote our welfare would be unproblematic, if only we had complete information. It seems harder today to accept without further argument the idea that disagreement about fundamental choices would vanish in the face of ideal knowledge.[21]

As deVries points out, we need some further argument for Sellars's assumption that it is categorically reasonable for us to promote our general welfare. On my view, the constructivist view of ethical concepts can help us deal with this problem. As pointed out in section 3, ethical norms depend on the ethical goal, and so ethical norms have their normative force for us only if we take the ethical goal to be reasonable. Hence, insofar as each of us participates in a community as one of us, we should take our ethical goal to be reasonable. In other words, on this constructivist view, one's membership in a community presupposes that one should take the ethical goal to be reasonable.

In a similar vein, we can defend P_1 by virtue of the constructivist view of the concept of epistemic justification. It is our epistemological presumption that our concept of epistemic justification is coherent, so that it is, at least in principle, possible for us to justify something. Even the sceptic can hardly deny this presumption. If the sceptic denies the coherence of the concept of epistemic justification, her sceptical position becomes self-defeating, for she cannot defend it. Thus we are entitled to hold the above epistemological presumption unless and until the sceptic somehow provides us with *positive* reasons to show that our concept of epistemic justification is incoherent. In addition, as argued in section 3, the concept of epistemic justification is goal-dependent in such a way that the coherence of this concept depends on the reasonableness of our epistemic goal. For this reason, even the sceptic can hardly deny the reasonableness of our epistemic goal. As mentioned above, if the sceptic denies the reasonableness of the epistemic goal, she thereby undermines the concept of epistemic justification. And if she undermines the concept of epistemic justification, her sceptical position becomes self-defeating. Due to these reasons, we can claim that it is reasonable for us to realize our epistemic goal. And the scientific goal of predicting and explaining the world is part of our epistemic goal. Hence, even the sceptic can hardly deny that it is

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reasonable for us to realize the scientific goal. In other words, we can endorse P_1 unless and until the sceptic somehow provides us with positive reasons to show that our concept of epistemic justification is incoherent. I shall say more about this in the next section.

Along these lines of reasoning, we can defend P_1 and P_2 and hence, by virtue of the validity of the aforementioned normative argument, we can also defend C. That is, it is reasonable for us to accept induction. In addition, since the reasonable goal by virtue of which induction is justified is the *epistemic* goal, we may also say that it is *epistemically* reasonable for us to accept inductively supported conclusions.[22]

5. Possible Objections

According to Ralph Walker, it is reasonable to accept inductively supported beliefs "because we have no alternative but to rely on the method which generates them."[23] My proposal in this paper is somewhat similar to his argument because I take induction to be the only means of predicting and explaining the world. Graham Bird objects, however, that "there is no inference from 'no alternative' to 'true' or 'justified'." [24]

Admittedly, there is something right about Bird's objection, for the following argument is invalid as a theoretical argument:

(α) There is no alternative but to rely on *p*.
∴ *p* is truth-conducive.

Note that (α) is neither deductively justified nor inductively justified. In a similar vein, Bas van Fraassen objects to the inference to the best explanation as follows:

> Circumstances may force us to act on the best alternative open to us. They cannot force us to believe that it is, *ipso facto*, a good alternative.[25]

As van Fraassen correctly points out, we cannot infer that *p* is truth-conducive from the fact that *p* is the best explanation among our hypotheses. For this sort of inference to the best explanation depends on an additional assumption that a true hypothesis exists among the hypotheses under consideration.

But the above sort of objection does not pose a serious problem for my argument, because my argument does not appeal to (α). My argument is not a theoretical argument but *a practical* argument, and so its conclusion is not that inductively supported conclusions are truth-conducive, but rather that it is *reasonable* for us to accept inductively supported conclusions. Consider the following argument again:

> It is reasonable for us to realize our epistemic goal of predicting and explaining the world.

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Induction is the only means to the above epistemic goal.
∴ It is reasonable for us to accept induction.

First of all, as explained in section 2, the above argument is valid. Second, as argued in section 4, the second premise is not really controversial because induction is the only ampliative inference we have. Third, as also argued in section 4, even the sceptic can hardly deny the first premise. The sceptic must share the concept of epistemic justification with the non-sceptic in order to make her sceptical claim that it is *unjustified* to accept induction. If the sceptic and the non-sceptic do not share the concept of epistemic justification, they cannot engage in a genuine debate. In addition, the concept of epistemic justification depends on the reasonableness of our epistemic goal of predicting and explaining the world. Thus, if the sceptic denies the reasonableness of this epistemic goal, she thereby undermines the concept of epistemic justification. If she undermines the concept of epistemic justification, she cannot claim that it is *unjustified* to accept induction.

But what if the sceptic doesn't want a debate and just wants to undermine reason at every turn? She might always respond to any claim with "You are not justified in saying that."[26] In the first place, if the sceptic and the non-sceptic do not share the concept of justification, the non-sceptic cannot understand such a response as "You are not *justified* in saying that." Thus, the sceptic must share the concept of justification with the non-sceptic in order for her to make the above response. In the second place, the infinite regress of justification is impossible. Suppose that one defends one's claim by offering a ground, p. The sceptic can call this ground into question by saying, "Why p?" To meet this challenge, the claimer might provide another ground, q. The sceptic can, in turn, call this ground into question by saying, "Why q?" Here it should be noted that if the sceptic were entitled to keep raising the question "Why is that?" to any reply of the claimer, there would be no claim that the claimer can ultimately justify. But the concept of justification presupposes that it is at least in principle possible for us to justify something.[27] Therefore, until and unless the sceptic provides us with *positive* reasons to believe that our epistemic goal is unreasonable, we are entitled to the first premise. That is, the burden of proof lies on the shoulders of the sceptic.

Now let us turn to another possible objection. An argument "is said to be transcendental in attempting to prove something by showing that it is required as a solution to a problem."[28] On my argument, induction is required as the only means of predicting and explaining the world. Thus my argument is somewhat similar to a transcendental argument. But Barry Stroud challenges such a transcendental argument by claiming that it can yield a conclusion only about what we must believe to be the case, not about what must really be the case, whereas defeating scepticism involves showing instead how things really are. Thus, according to Stroud, such a transcendental argument cannot meet the sceptical challenge because it cannot cross the gap between *what we believe*

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and *how things really are*. Following this Stroudian objection, someone might challenge my proposal as follows: In order to make the concept of epistemic justification coherent, we must believe that the world is predictable and explainable; but this belief need not actually be true.[29]

The above Stroudian objection does not pose a serious problem for my argument, however. First of all, as mentioned above, the conclusion of my argument is not that inductively supported conclusions are truth-conducive, but rather that it is *reasonable* for us to accept inductively supported conclusions; in order to defend such reasonableness I do not need to exclude the logical possibility that the world might be unpredictable and unexplainable. Second, and again as mentioned above, if the world were unpredictable and unexplainable, our epistemic goal would be unreasonable to the effect that the concept of epistemic justification would be incoherent. Then it would not even make sense to say that it is *unjustified* to accept inductively supported conclusions. In a similar vein, if the world were unpredictable and unexplainable, any ampliative inference simply would be useless, so that the question of how to justify induction would not arise from the beginning; for the sceptic cannot challenge us to solve what cannot be solved. Finally, our welfare is a reasonable goal, and we should not give up this reasonable goal unless the sceptic conclusively shows that we cannot act so as to promote our welfare. For it is unreasonable to give up our real chance to promote our welfare unless it is shown that we have no such chance. For these reasons, until and unless the sceptic provides us with *positive* reasons to believe that the world is unpredictable and unexplainable, it is reasonable for us to presuppose that the world is predictable and explainable.

6. Accidental Generalizations versus Lawful Generalizations

I have argued so far that it is reasonable to accept inductively supported conclusions. But this does not mean that it is reasonable to accept just any inductive inference, for there indeed are unwarranted inductive inferences. Thus, in this final section, let me briefly discuss *which* inductive inferences it is reasonable to accept.

To begin with, let us compare the following two universal inductive arguments:

(1) All observed emeralds have been green.
∴ (Probably) all emeralds are green.

(2) All the coins I have received as change have been quarters.
∴ (Probably) all the coins I receive as change are quarters.

At least on the surface, these two arguments have the same logical form. But, intuitively, it is reasonable to accept the conclusion of (1), whereas it is unreasonable to accept the conclusion of (2). If one finds a non-green emerald it will be very surprising, whereas it won't be surprising at all if one receives a

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dime as change in the near future. Despite the same logical form, why is it that one is warranted and the other is not?

As argued in sections 4 and 5, the concept of epistemic justification presupposes that the world is predictable and explainable. If the world is predictable and explainable, there must be lawful relations in the world. Now consider the following two inferences:

(1') "x is an emerald" → "x is green"
(2') "x is a coin I receive as change" → "x is a quarter"

Unlike accidental generalizations, lawful generalizations support counterfactuals. If one does not accept the possibility that there might be a non-green emerald, one will accept (1'). By contrast, if one accepts the possibility that one might receive a coin other than a quarter as change, one will not accept (2').

According to Sellars, we need "a certain integrated system of means" to achieve our epistemic goal.[30] As finite epistemic agents in the world, we have no better means to our epistemic goal than accepting the best hypotheses which have the intended predictive and explanatory powers. Thus, the integrated system of means to our epistemic goal requires us to accept such best hypotheses by virtue of explanatory and predictive power; in other words, the following holds:

> It is reasonable not only to explain why the constant conjunction between "x is *A*" and "x is *B*" has been held so far, but also to predict that we will continue to observe this constant conjunction.
> Relevant things considered, that all *A*s are *B*s is the best hypothesis for this epistemic goal.
> ∴ It is reasonable to accept that all *A*s are *B*s.

In the case of (1), we intend to explain why all observed emeralds have been green. We also intend to predict that we will continue to observe only green emeralds. But our empirical evidence is only that we have so far encountered only green emeralds. If we accept that (1') is a lawful relation, we can have the intended explanation and prediction. The reason why we did not observe any non-green emerald is that (1') is a lawful relation. In addition, the reason why we will not observe any non-green emerald is the same, namely, that (1') is a lawful relation. Hence, if it is a reasonable goal not only to predict that we will continue to observe only green emeralds, but also to explain why all observed emeralds have been green, and if (1') is the best hypothesis by virtue of explanatory and predictive power, then it is reasonable to accept that all emeralds are green. Now, considering relevant factors such as our background beliefs about the relation between the chemical compositions of jewels like emeralds and

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their colours, and an enormously large number of observed emeralds, that (1') is a lawful relation is a much better hypothesis by virtue of explanatory and predictive power than that we have so far observed only green emeralds by pure accident. For this reason, we may claim that relevant things considered, it is reasonable to accept that all emeralds are green.

By contrast, we cannot provide the analogous practical argument with regard to (2). Considering relevant factors such as our background beliefs about our social practice of giving and receiving coins as change, and a small number of quarters I have received as change, there is no good reason to think that (2') is a lawful relation by virtue of explanatory and predictive power. Besides, considering such relevant things, we are not pressed to explain why I have received only quarters so far, nor are we pressed to predict that I will continue to receive only quarters, because it is likely to be just purely accidental that I have so far received only quarters. For this reason, we may claim that relevant things considered, it is unreasonable to accept that all the coins I receive as change are quarters.

It is not an easy task to conclusively establish that there is a lawful relation between "x is *A*" and "x is *B*" on the basis of the fact that all observed *A*s are *B*s. But it should be noted that we don't need to conclusively establish that (1') is a lawful relation in order to make such a probability statement as "probably all emeralds are green." In the basic non-metrical sense of "probable," to say that *p* is probable is to say that, relevant things considered, it is reasonable to accept that *p*.[31] For example, we can make a probability statement "probably all emeralds are green" if, relevant things considered, the lawful relation of (1') is the best hypothesis by virtue of explanatory and predictive power. In addition, to make such a probability statement as "*p* is probable," we are not required to mention *specific* evidence, nor are we required to *specify* the logical relation in which *p* stands to the evidence.[32] To claim that relevant things considered it is reasonable to accept that *p* is to issue a sort of *promissory note* authorizing the existence of a good practical argument which has as its conclusion "it is reasonable to accept that *p*." Insofar as we continue to have the intended predictive and explanatory power by accepting (1'), we can issue such a promissory note. Of course, it is possible that such a promissory note might bounce. Consider the following argument:

(3) All swans observed so far have been white.
∴ (Probably) all swans are white.

Before black swans were found in Australia in the early eighteenth century, people took "All swans are white" to be probably true. This was because people were able to make their intended explanation and prediction by accepting the lawful relation between "x is a swan" and "x is white"; that is, they were able to explain that a huge number of swans observed up to that time had all been white, and they were also able to predict that they would continue to

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observe only white swans. Thus, considering relevant factors available before black swans were found in Australia, it was reasonable to accept that all swans are white by virtue of explanatory and predictive power. In other words, people were in a position to issue a promissory note authorizing the existence of a sound practical argument which had as its conclusion "It is reasonable to accept that all swans are white." But this promissory note bounced as soon as a counter-example was found. As soon as black swans were found, the hypothesis that all swans are white lost its explanatory and predictive power to the effect that it is not reasonable to explain why all observed swans are white, nor is it reasonable to predict that we will not observe any non-white swan.

Besides universal inductive generalizations, there are other types of inductive arguments such as statistical inductive generalizations and statistical syllogisms. Slightly different considerations are required to determine which inferences among them are reasonable to accept, but I will not go into details in this paper.[33]

In this paper I have argued that the concept of epistemic justification is goal-dependent in such a way that the coherence of this concept depends on the reasonableness of our epistemic goal. To put it another way, the supposition that our epistemic goal is reasonable is part of our concept of epistemic justification. In addition, as far as we know, induction is the only possible means of realizing our epistemic goal. Hence, until and unless the sceptic somehow provides us with *positive* reasons to believe that our epistemic goal is unreasonable, we may say that it is reasonable for us to accept inductively supported conclusions.[34]

Notes

1 Cf. Hume, section 4, part 2, p. 36: "That there are no demonstrative arguments in the case seems evident; since it implies no contradiction that the course of nature may change, and that an object, seemingly like those which we have experienced, may be attended with different or contrary effects."

2 Cf. ibid., p. 38: "To say it is experimental, is begging the question. For all inferences from experience suppose, as their foundation, that the future will resemble the past, and that similar powers will be conjoined with similar sensible qualities. If there be any suspicion that the course of nature may change, and that the past may be no rule for the future, all experience becomes useless, and can give rise to no inference or conclusion. It is impossible, therefore, that any arguments from experience can prove this resemblance of the past to the future; since all these arguments are founded on the supposition of that resemblance."

3 Broad, p. 143.

4 To put it another way, I cannot realize E unless I take M.

5 Cf. Korsgaard, p. 56: "To will an end just is to will to cause or realize the end, hence to will to take the means to the end. This is the sense in which the [instrumental] principle is analytic. The instrumental principle is *constitutive* of an act of the will. If you do not follow it, you are not willing the end at all" (emphasis Korsgaard's).

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For a more detailed discussion of the validity of practical argument, see Sellars 1967.

6 On the Humean conception of rationality, rationality is a matter of efficiency of goal attainment. But many philosophers such as Sellars, Rescher, and Korsgaard reject this conception of rationality. Cf. Sellars 1967, p. 210: "[A] good practical argument is one in which the conclusion intention is not only implied by the premise intention, so that it is reasonable *relative to* the premise, as in the case of arguments authorized by hypothetical imperatives, but also one in which the premise intention is reasonable *per se*. … [Kant] is attempting to discover what might make practical arguments *good* as opposed to merely *valid*" (emphasis Sellars's). Cf. Rescher, p. 96: "Hume's profound error lay in his taking a part of *reason* to be the *whole* of it. For, reason at large must care for ends as well as means. If our ends (our goals and values) are themselves inappropriate—if they run counter to our real and legitimate interests—then no matter how sagaciously we cultivate them, we are not being fully rational" (emphasis Rescher's). Cf. Korsgaard, p. 43: "The instrumental principle says nothing about our ends, so it is completely unequipped to say either that we ought to desire our overall good or that we ought to prefer it to more immediate or local satisfactions."

7 Rescher, p. 96.

8 Ibid., p. 6: "Rationality is thus a two-sided, Janus-faced conception. On the side of means, it reflects a pragmatic concern for efficient process, while on the side of 'appropriateness of ends' it reflects a value-geared concern for product."

9 Here "reasonable" is not a purely descriptive expression but a normative expression. Thus this argument is a valid argument in which our *normative* vocabulary occurs essentially. No normative conclusion can be derived from anything other than a normative premise due to the fact-value gap. For this reason, this argument is not an ordinary deductive argument, which consists of statements of *descriptive* matters of fact. It is rather an argument which shows why it is *reasonable* to take means M.

10 Rescher, p. 99.

11 Korsgaard, p. 23.

12 Cf. Hobbes, chapter 13, p. 188: "To this warre of every man against every man, this also is consequent; that nothing can be Unjust. The notions of Right and Wrong, Justice and Injustice, have there no place."

13 Cf. Korsgaard, p. 22.

14 Sellars 1967, p. 222.

15 Cf. ibid., p. 223: "Kant believed himself to have established that the 'we' of the moral point of view is *rational beings generally*" (emphasis Sellars's).

16 Reichenbach, p. 450.

17 Here it is worth distinguishing the following two questions: (i) Is it reasonable to accept inductively supported conclusions? (ii) *Which* inductive inferences is it reasonable to accept? Hume's scepticism about induction is concerned with the first question. I shall discuss the second question in section 6.

18 Pitt, p. 15.

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19 Ibid., pp. 88-9.

20 Sellars 1974b, pp. 437-8. Cf. Sellars 1959, p. 231: "The only frame of mind which can provide *direct* support for moral commitment is what Josiah Royce called Loyalty, and what Christians call Love (Charity). *This is a commitment deeper than any commitment to abstract principle*. It is this commitment to the well-being of our fellow man which stands to the justification of moral principles as the purpose of acquiring the ability to explain and predict stands to the justification of scientific theories" (emphasis Sellars's).

21 DeVries, pp. 267-8.

22 Cf. Sellars 1974b, p. 436: "The phrase 'ε-reasonable' carries with it the implication that the end in terms of which the accepting of '*p*' is justified by such arguments is an epistemic one."

23 Walker, p. 17.

24 Bird, p. 38.

25 van Fraassen, pp. 144-5.

26 An anonymous referee has raised this objection.

27 For a more detailed discussion and defense of this claim, see my 2008 paper "A Pragmatic Phenomenalist Account of Knowledge" in *Dialogue: Canadian Philosophical Review* 47: 565-82.

28 Stroud 1999, p. 157.

29 Cf. Stroud 1968, p. 255: "In particular, for any candidate *S*, proposed as a member of the privileged class, the sceptic can always very plausibly insist that it is enough to make language possible if we *believe* that *S* is true, or if it looks for all the world as if it is, but that *S* needn't actually be true" (emphasis Stroud's).

30 Cf. Sellars 1979, p. 179: "[A]chieving a certain end or goal can be (deductively) shown to require a certain integrated system of means. … [A]mong the necessary means to this end is the espousal of certain patterns of reasoning, specifically those involved in the establishing of statistical hypotheses, laws and theories. … [T]hey are elements in a conceptual framework which defines what it is to be a finite knower in a world one never made. … To be one who makes epistemic appraisals is to be in this framework. And to be in this framework is to appreciate the interplay of the reasonableness of inductive hypotheses and of IPM [introspective, perceptual, and memory] judgments."

31 Cf. Sellars 1974a, p. 368: "In the basic non-metrical sense of 'probable' (in relation to which all other senses are to be understood), to say of a statement or proposition that it is probable is, in first approximation, to say that it is worthy of credence, that it is acceptable in the sense of being worthy of credence; that is, to put it in a way which points toward a finer grained analysis, it is to say that relevant things considered there is good reason to accept it." Cf. ibid., p. 372: "[I]f 'it is probable that-*p*' has anything like the sense of 'relevant things considered, it is reasonable to accept that-*p*', then it tells us that there is a good argument which takes relevant things into account and has as its conclusion *I shall accept that p*" (emphasis Sellars's).

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32 Cf. ibid., pp. 373-4: "This is obviously false if intended to mean that a well formed probability statement must mention *specific* evidence and *specify* the logical relation in which the proposition in question stands to the evidence. On the other hand, it is indeed true that 'it is probable that *p*' is in some sense elliptical for a statement making a *general* reference to the evidence and its relation to the proposition that *p*" (emphasis Sellars's). Cf. ibid., p. 374: "[T]he real reason why 'it is probable that *p*' is 'incomplete' is that it points to a practical argument which it doesn't enable one to construct."

33 An anonymous referee has raised the following objection: "In section 6 the author argues that the inductively supported conclusions we are entitled to accept (given appropriate acceptable premises) are invariably 'lawful generalizations,' exceptions which we would not accept (given our evidence). This claim is dubious on two grounds. First, if inductive conclusions are no more than probable, as the author says, how could we reasonably believe that exceptions could not occur? If they are merely probable (rather than necessary), reasonable persons should concede that exceptions must be possible. Second, the idea that acceptable inductive conclusions are invariably lawful generalizations is pretty obviously false: statistical conclusions commonly accepted on the basis of data samples are often patently contingent claims. The conclusion that the president's approval rating is 47.6 percent would be a case in point."

First of all, as mentioned in the text, to claim that relevant things considered it is reasonable to accept that all emeralds are green is to issue a sort of *promissory note* authorizing the existence of a good practical argument which has as its conclusion "It is reasonable to accept that all emeralds are green." Thus, in making such a *universal* inductive generalization as "all emeralds are green," we do not concede that there might be an exception to this universal claim. Only by accepting that there will be no such exception, can we have the intended predictive and explanatory power. For this reason, what we concede by making such a probability statement as "*probably* all emeralds are green" is not that there might be an exception to this universal claim, but rather that it is possible that the aforementioned promissory note might bounce. If we were to find an exception to the universal claim "all emeralds are green," we could not make the universal inductive generalization. That is, we could not make even the probability claim "*probably* all emeralds are green."

Second, I do not claim that all acceptable inductive conclusions are invariably lawful generalizations. For example, statistical inductive generalizations might not be lawful generalizations. According to the basic *non-metrical* concept of probability, as mentioned in the text, to say that *p* is probable is to say that relevant things considered it is reasonable to accept that *p*. But there is also a *metrical* concept of probability found in statistical contexts. Thus it is important to understand the relation between the non-metrical concept of probability and the metrical concept of probability. Suppose that the probability that *p* is true is n/m. If there is a sound practical argument which contains this metrical probability as a premise and has "It is reasonable to accept that *p*" as the conclusion, then we can accept that *p* as an

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inductively supported conclusion. For example, let us consider the following statistical syllogism:

> 9 out of 10 balls in an urn are red.
> a_1 is a randomly selected one from these 10 balls.
> Therefore, (probably) a_1 is red.

The probability that "a_1 is red" is true is 9/10. Thus, the above statistical syllogism allows the possibility that a_1 might not be red. Is it then reasonable for us to accept the above conclusion? As Keith Lehrer (pp. 145-6) points out, "[P]robability is only one factor relevant to deciding what is reasonable to accept in the interests of obtaining truth and avoiding error. … The probability of a statement tells us what our risk of error is, but it tells us nothing about how much we gain in accepting it when it is true." Now consider a practical argument of the following sort:

> It is reasonable to acquire truth-conducive beliefs about the world. Relevant things considered, accepting that *p* is the best means to the above epistemic goal. Therefore, it is reasonable to accept that *p*.

As mentioned in section 3, our epistemic goal is to acquire truth-conducive beliefs about the world. In addition, if "a_1 is red" is very informative about the world and its risk of error is very small, then accepting this statement might be the best means to the above epistemic goal. We can then claim that it is reasonable to accept that a_1 is red; in other words, in the basic non-metrical sense of "probable," we may claim that probably a1 is red.

Finally, let us briefly consider another form of inductive inference:

> 47.6 per cent of American voters sampled in a recent poll approve of the president's performance. Therefore, (probably) 47.6 per cent of American voters approve of the president's performance.

Is it reasonable to accept the above statistical generalization? If so, what is the reason? We might answer this question by means of a practical argument of the following sort:

> It is reasonable to find out the president's approval rating. In the present circumstances, an opinion poll of random samples of American voters is the best means to this goal. Therefore, in the present circumstances, it is reasonable to accept the conclusion derived from an opinion poll of random samples of American voters.

Since the president's political influence is significant, at least in certain circumstances, it may be a reasonable goal to find out the president's approval rating. In addition, since it is impractical to poll all American voters, a poll based on samples of American voters might be the best means to this goal in certain circumstances.

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Under these conditions, we may claim that it is reasonable to accept the above sort of statistical generalization. In short, by providing practical arguments of the above sort, we may determine which statistical generalizations it is reasonable to accept. For a more detailed discussion of the metrical concept of probability, see Sellars 1974a.

34 I would like to thank two anonymous referees for their helpful comments on an early version of this article.

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