INDUCTION IN THE 'GRUE' - SOME WORLD

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Induction is a form of inference in which one argues that the predicate asserted to be true for the narrow universe is confirmed for the whole universe of discourse. All emeralds examined so far are found to be green and none found to be non-green is a truth about 'emeralds' examined so far. The predicate 'green' states a truthfulness about narrow universe of the colour of 'emerald', for the truthfulness of the statement is restricted to the present time and the predicate 'greenness' asserts about the colour of 'emerald' up to now. The whole universe of 'emeralds' includes all cases of emeralds examined and non-examined, in the past and future. The projection of the predicate green about the wider universe is open-ended. The emeralds even found in the distance planet will be green. The narrow universe of discourse is given and is called the evidence statement and the wider universe is called the hypothesis. Since all the emeralds we have so far observed have been green, we project the predicate 'green' to the wider universe of emeralds and adopt the hypothesis that 'all future emeralds probably are also going to be green".

The issue of justifying induction involves the description of "an accurate and general way of saying which hypotheses are confirmed by or which projections are validly made from, any given evidence."[1] The inductive rule takes care of not only the fact that "when, how and why the proceeding from a given set of beliefs to a wider set is legitimate"[2], but also it explains "why one prediction rather than another"[3], from a given evidence statement. The inductive rule provides a general and accurate mechanism to license or justify such projection of the predicates. On the one hand, the inductive rules guide us to project the appropriate predicate

among the rival and available predicates, on the other, these rules provide the justification for such selection.

Therefore, the task of the inductive rule is twofold. First, the inductive rule should contain a mechanism to provide the legitimacy in projectible hypotheses that have been actually projected and second, the inductive rule helps us to rule out all those projected hypothesis that are not to be considered projectible, and thus "the two-fold problem of projected unprojectable and unprojected projectable."[4] Some of the questions to be answered concerning induction are: when, how and why the inductive generalisation from a given evidence statements to the wider set is possible? In other words, how we acquire, modify and eliminate our hypothesis on the basis of the given set of beliefs? Further. How the hypothesis which is always more than the given, gets confirmation from the evidence statements? Thus, it is, "a problem of defining the difference between valid and invalid projection."[5]

The issue of the projection of the genuine predicate or the adaptation of the hypothesis , therefore, is essentially a normative issue, because its basic task is to find out the correct prediction by prescribing the appropriate inductive rule. The regulative rules of induction permit the right kind of projection of hypothesis from a given set of evidence statement and prohibit the projection of unwarranted, conflicting and unfamiliar predictions. The question is different from the descriptive question: how do we project beliefs or how exactly are the new beliefs formed from the given set of beliefs?

ENTERING INTO THE 'GRUE'-SOME WORLD

Philosophers have argued that such rules are readily discovered in the nature of the mind or in human behaviour or in the structure of the world. Kant, for example, argues that the inductive inference in particular and human reasoning in general, is structured in the mind. Our mind is so structured that we do not have any problem in arguing validly from a set of beliefs to a wider set. These rules are found in the form of rules of inference and are necessary and indubitable. There would be errors and mistakes, of course if those rules are not followed rigidly. However, we are not sure whether such a *priori* mental rules are there or not, for had there been such uniform mental rules the need for the existence of the variety of

inductive practice would not have been there. Even if such *a priori* rules are there, it is hardly enough to capture the inductive practice for those rules which do not say anything about the world and most of our inductive inferences are about the world.

The other way to seek such regulative rule of induction is to argue that the evidence statement contains natural kinds with fixed property. It is argued that the world is divided into different natural kinds and natural kinds possess such characteristics to set them apart as a kind of their own among other things. The common properties which the members possess are predictable and stable. The properties the possession of which by the examined members can warrantedly be inferred from the discovery that examined members have them, properties which examined members would have had even had they not been examined.[6] Therefore, we can be very much sure that the emerald as a natural kind possesses inherently such character that emeralds are always green wherever and whenever they are found. The nature of the things gives guidance to the future use according to the laws of uniformity of nature.

The problem in such inductive projection of predicate, as Hume has already conclusively argued, is not based on any logical principle because there is no contradiction involved in denying the statement of the inductive inference. Hume argues that the statements regarding wider universe are neither logical statements themselves, nor are they logical outcome of the evidence statements or inductive practices. The past instances or the evidence statements do not impose any logical compulsion over the occurrence of something yet to happen or on future events. There is no causal and logical connection found to be holding among the objects of the world. Hume has argued that there is no such fact as there is no contradiction involved in denying the propositions about the world or what he calls as a matter of fact. Hume's view has been supported in recent time by Quine's critique of a necessary propositions.[7] Even if things are causally related in the nature the description of such causal relation will not provide any normative inductive principle for, the specification of such causal relations are the simple description of the fact and it is always possible that the present causal relation may not hold true in the future and there is no contradictoin in such thinking.

Even if we can overcome Hume's problem, the process of inductive justification suffers a big blow in the form of Hampel's paradox of Raven. The paradox points out that any two statements however remote they may be, can provide inductive support to each other. For example, the statement that a given object, say this piece of paper is neither black nor a raven confirms the hypothesis that all non-black things are non-ravens. But this hypothesis is logically equivalent to the hypothesis that all ravens are black. Thus the conclusion that a given object is neither black nor a raven confirms the hypothesis that all ravens are black.[8] However, the so-called raven paradox can be resolved by clarifying the fact that the prediction is always from evidence statement to the hypothesis and not from any statement to any statement. The projection of a predicate is possible when there are some instances of the projection of such predicate. In other words, the projection of predicate or the prediction of the hypothesis is possible when there is some evidential support between the evidence statement and the statement indicating the projected predicate. Only those projections of predicates are inductively confirmed from the statements when these statements are found to be related, and more precisely there are positive cases of such relation and to negative cases so far. For example, if all emeralds examined before a certain time t are green, then at t our observations support the hypothesis that all emeralds are green and not any contrary hypothesis such as all emeralds are blue.

As if that were not enough, Popper declares that Induction is a myth. Popper argues that inductive inference is neither a psychological fact, nor a fact of ordinary life, nor one of scientific procedure. The actual procedure of science is to operate with conjectures: to jump to conclusions often after one single observation. The mistaken belief in induction is fortified by the need for a criterion of demarcation which, it is traditionally but wrongly believed, only the inductive method can provide.[9]

After all these problems if someone still thinks about the possibility of a logic of induction Goodman poses a riddle or paradox by arguing that the same evidence statement gives equal inductive support to two contradictory or incompatible predicates or hypothesis, i.e., the projections of predicates or adaptation of hypotheses may disagree or conflict for the

unexamined instances of the wider universe. Goodman calls this paradox as "the new riddle of induction."

The new riddle of induction poses the paradox by arguing that it is possible to envision a system of predicates rival to our own, such that a finding by us that all examined emeralds possess greenness will be equivalent to a finding that all examined emeralds possess non-greenness up to the present time. On the basis of such findings, the inference that the remaining emeralds possess greenness is inconsistent with the inference that the remaining emeralds also possess non-greenness. Both the hypotheses have as much inductive support for both hypotheses as both of them have equal numbers of positive instances in favour of them and no negative instances against them up to now. However, the future projection or predicates about the wider universe of discourse will be inconsistent with the inference that remaining emeralds possess non-greenness.[10] There is no logical compulsion to exclude the unwarranted projections like blue and include the lawful projection green for the adaptation of the hypotheses that "all emeralds will be green" from the evidence statements that "all emeralds examined before a certain time are green." Goodman argues that this is possible if we can imagine a predicate such as 'grue' which is to be understood as applying to a thing at a given time t if and only if either the thing is then green and the time is prior to time t, or the thing is then blue and the time not prior to t. He presents the grue counter-example as follows:

> Now let me introduce another predicate less familiar than "green". It is the predicate "grue" and it applies to all things examined before t just in case they are green but to other things just in case they are blue. Then at time t we have for each evidence statement asserting that a given emerald is green, a parallel evidence statement asserting that the grue. And the statements that emerald a is grue, b is grue, and so on, will each conform the general hypothesis that all emeralds are grue. Thus according to our definition, the prediction that all emeralds subsequently examined will be green and the prediction that all will be grue are alike confirmed by evidence describing the same observations. But if an emerald subsequently examined is grue, it is blue and hence not green.[11]

The grue predicate is defined commonly as "a predicate which applies to a

thing x, if x is examined before a time *t* and found to be green and x is examined after *t* and is blue." Schematically the predicate grue can be defined as:

$$x \text{ is grue} = df \text{ (x is observed before the time } t \text{ \& x is green) and}$$

$$\text{(x is not observed before the time } t \text{ \& x is blue)}[12]$$

The definition of the predicate grue says "that till time *t*, both objects which are green and blue are green. If it is green, it is grue and if it is blue, then it is grue." That is to say in this formulation green and blue are not incompatible predicates. But after time *t*, they are said to be incompatible predicates.

The new riddle poses a paradox by revealing that incompatible and rival hypotheses can be inferred from the same evidence statemnt. Evidence statements, for example "all emeralds examined so far are green," leave us with no choice to select hypotheses of incompatibility, i.e., "all emeralds after *t* is grue (blue)" and "all emeralds examined after *t* is green." though we know which of the predicates is genuinely confirmed, both the genuine predicate, i.e. green and its rival predicate, i.e. grue are equally confirmed according to the definition of grue. Thus Goodman says, "it is clear that if we simply choose an appropriate predicate, then on the basis of these same observations we shall have equal confirmation for many predication whatever about other emeralds-indeed about anything else."[13] There is no satisfactory inductive principle to exclude the unwanted and unacceptable predicate grue and include the legitimate predicate green in the projection of the hypotheses. All adaptation of the hypotheses, based on the evidence statements are only unjustified leap. Our future moves and predictions are all indeterminate-there is no right or wrong projection of predicates *per se* and incompatible hypotheses are equally acceptable.

Denying that there are such things as rules of induction, it puts in jeopardy some of our most central notions about ourselves. It puts question mark on the notion of world as an objective and independent entity requiring us to describe it one way rather than other. If the riddle is allowed to have its sway, the building of knowledge system is impossible. If it is pressed further, the conception of the meaning as an objective entity will be in danger and linguistic transactions are made impossible. The new riddle of

induction can very much affect our day-to-day life and it is generalizable to other fields of study as well. Indeed Goodman has painted a 'grue'-some world through the riddle and has stage-managed the grue-some murder of our faith, hope and expectation about ourselves, friends, society and the world at large.

PREVENTING GOODMAN

The grue-some world would leave us in a state of wilderness of doubt and uncertainty.[14] Thus attempts are made to prevent Goodman to raise/introduce grue predicate to posit a world where things are not related inherently, where past experience is not sure guide to expect or hope things to happen. The critics have argued that since the definition of the predicate grue looks artificial and fabricated, the riddle also presents an artificial paradox. The apparent arbitrariness of the grue predicate is proved by the critics on the ground that the grue predicate is temporal, asymmetrical and complicated as compared to the green predicate.

First, the predicate 'grue' is illegitimate as compared to the predicate 'green', because the hypothesis that "all emeralds are grue" is a temporal hypothesis. The grue predicate has been defined in reference to time-factor. It seems that the hypothesis typically involves some spatial and temporal restriction or reference to some particular individual. The grue predicate, unlike the green predicate lacks complete generality and universality to be consistenly projected even if there is an evidence for such prediction.[15] It seems clear that the predicates 'green' and 'blue' are qualitative or universal and predicate like 'grue' is temporal. However, Goodman argues that temporality is very difficult to define. The mere requirement that temporal hypothesis contains terms which names and describes thing in respect to particular time and place is not enough to differentiate it from general and universal hypotheses. The hypotheses that all emerald are grue does not contain any temporal terms. Even if there is reference to time and space, that can be suppressed and expressed in the form of general hypothesis. On the other hand, it is possible that even the so-called universal projection like all emeralds are green can be expressed in temporal and spatial terms. Goodman writes:

> This will obviously accomplish nothing if purely qualitative predicate

is then conceived either as one that is equivalent to some expression free of terms for specific individuals... I simply do not know how to tell whether a predicate is qualitative or positional, except perhaps by completely begging the question at issue.[16]

Second, it is argued that the grue predicate is contradictory to green predicate because it is asymmetrical to green. The foreignness of the predicate grue can be proved on the ground that it does not go with the established predicate which is a part of our language. The grue-speaker speaks incoherent language in comparison to our green-speaker. There are elaborate descriptions of grue-land and grue-speakers to show how green-language and grue-language do not go together.[17] The paradox to be generated, the grue predicate must conform to two constraints—the relationship with our concept of green and blue and second, it should be understood in contrast with our concept of green and blue. Mulhill argues that both the conditions cannot be satisfied simultaneously.[18] Ian Hacking seems to agree with Mulhill at least partially in saying that Goodman's paradox cannot be raised for disunified science.[19] Goodman refutes this charge by arguing that both the predicate grue and green are symmetrical and one can be understood as unfamiliar in contrast to other.

it is true that the predicate grue is foreign and its foreignness can be proved relative to our custom of projection and language. However, relative to the imagery language of the grue-speakees and their custom of projection, our predicate 'green' would be equally foreign. From their custom of projection, the projection of the hypothesis "all emeralds are green" appears to be outlandish. This can be argued by the grue speakers. One need only to note that Grue-speakers also have the predicate 'bleen' in their language, where,

x is bleen =df (x is observed before the time t & x is blue) and

(x is not observed before the time t & x is green)[20]

As Goodman says :

True enough, if we start with "blue" and "green," then "grue" and "bleen" will be explained in terms of "blue", and "green" and a temporal term. But equally true, if we start with "gure" and "bleen", then "blue" and "green" will be explained in terms of "grue" and

"bleen" and a temporal term.[21]

Third, the grue hypothesis is rejected on the ground that it is more complicated and odd compared to the green predicate and the common sense says that simple predicates like green stand better chance for projection compared to the complex predicates. The argument does not hold much water as 'simplicity' is a relative term and very difficult to define. There is no criterion to differentiate simple from complex hypothesis. One hypothesis can be simpler to someone, but very complicated to other.[22] With the introduction of each new theory and problem some new and peculiar predicates are introduced along with the problem. On account of newness the predicate does not become odd. If this is true many of the new terms in the science, for example "aluminium" would have been abandoned.

There are also attempts to rule out grue as useless on pragmatic and evolutionary ground. It is argued that it is a "fortunate coincidence or harmony between our past behaviour and future action, established by the evolutionary process and this harmony works for us."[23] Thus, as Martin argues that people have predisposition against grue,[24] for grue is a "peculiar predicate and abnormal concept" and the truth or falsity makes no "discoverable difference to our day-to-day life."[25] The problem has been dismissed as immaterial because we do not project grue predicate generally. The unfamiliar predicates like grue do not make any difference in our understanding our day-to-day inductive practice and we can pragmatically avoid such useless predicates. But if we want a philosophically a sound theory of induction we cannot "excuse gross anomalies resulting from a proposed theory by pleading that we can avoid them in practice."[26] We should be very clear that the validity question is not a pragmatic question. If pragmatism is the only consideration involved in the projection, probably we can avoid unfamiliar predicate easily. But the successful elimination of unwanted projection will be there at the cost of a proper theory of justification of inductive inference. The predicate grue cannot be eliminated just by saying that the predicate is not positional, qualitative or observational.

THE ENTRENCHED WORLD

The validity of inductive prediction cannot be determined just by looking at the object or being into the mind. This is not possible either by invoking the innate principle in the mind or the evolutionary principle. Even if we had the ability to read the mental processes, the problem could not have been answered squarely. The reason is, any amount of describing the fact about the world or about the mind or their interaction would not give us any clue as to what ought to be the next prediction. The new riddle of induction shows that normativity of the inductive rule or for that matter any normative rule cannot be captured in the description of the laws of nature or the working condition of the mind, for the future is not given. It should be noted that even if we could prevent the introduction of grue predicate, thereby the spirit of the riddle is not resolved. Another suitable counter-example can be introduced to posit the problem since it is a problem that can be visualised logically.

Goodman, thus, argues that no higher level principles of unquestionalbe certainty can justify the inductive rules. And yet, we do make induction and induction is a very reliable process in science and in our day-to-day life as well. Thus, Goodman argues that perhaps the way we actually *do* apply induction and are habituated with it will provide the necessary cue in justifying induction. Goodman says, "The point is that rules and particular inferences alike are justified by being brought out into agreement with each other. A rule is amended if it yields an inference we are unwilling to accept, an inference is rejected if it violates a rule we are unwilling to amend."[27] Goodman argues that we are thus able to eliminate a predicate which is not an application of the well accepted general rules. When there is a need to introduce a new predicate we amend the rule to accommodate the inductive rules. That is what has happened with the predicate 'mammal' when it is applied to the 'whale.' Thus he says, "predictions are justified if they conform to the valid cannon of induction, and the cannons are valid if they accurately codify accepted inductive practices."[28]

Goodman agrees that his solution to the riddle of induction is primarily Humean in nature. According to Hume, only those hypotheses are validly projected which we are habituated to project. We build our inductive

practices, not on the basis of som logical principle or on the basis of the necessary connection available : nong the events in the world, but on the basis of our record of two tl ings occurring together. The repeated occurrences of two things make us believe psychologically that those two things are connected in the world and will remain so in the future. Our habit and naturalistic instinct are the basis of our inductive practices. Those hypotheses are considered to be deviant which are not habitually so related. Hume formulates the rules of induction on the basis of describing our inductive habits and practices. Though he has understood the real nature of inductive the new riddle of induction, he fails to go deep into the problem. His solution at best "pertains only to the source of prediction, and not their legitimacy" and "leave untouched the question of our licence for making them."[29] Hume's account explains how a particular prediction is made out of our habit. This simple description will not be enough to explain why some of our habits give rise to regularity and others do not. The real inadequacy of Hume's account 'lay not in his descriptive approach but in the imprecision of his description"[30]

Hume's solution is inadequate in explaining the new riddle of induction because he fails to see the force of his argument. Hume himself has not taken seriously the importance of the "records of past predictions actually made"[31] and undermined the legitimacy of information that are made in explaining scepticism. He was hesitant to use the valuable "knowledge of past predictions and their success and failures"[32] for the fear of circularity. But there is no circularity involved in devising a satisfactory inductive rule taking feedback from the past projections for we are still defining valid projection or projectibility and ot demonstrating it. Thus Goodman says, "an inductive inference is justified by conforming to accepted inductive inferences. Predictions are justified if they conform valid conons of induction and conons are valid if they accurately codify the accepted inductive practice."[33] The process comprises the act of "defining projectibility–of projecting the predicate 'project' to the predicate 'projectable'."[34] The basic task of justifying inductive inference, therefore, is like mapping out our inductive habits and mark some regularity generating habits from those habits which do not.

Thus Goodman himself admits that, there is no hard and fast

distinction between justifying inductive rules and describing ordinary inductive practices. He says, "the problem of justifying induction is not something over and above the problem of describing or defining valid induction."[35] The gap between the inductive rules and the projection of the predicates can be bridged on the basis of the record of actual projection. The actual projection involves the description of the "overt, explicit formulation and adaptation of the hypothesis."[36] According to him, a hypothesis is said to be actually projected, "when it is adopted after some of its instances have been examined and determined to be true and before the rest have been examined."[37] The mere history of actual projection, as Hume argues, is not enough to map the inductive practice and help us to eliminate unwanted projection like grue. Because, the set of past projections provides nothing more than the evidence ground and as we have seen in the grue problem, it can very much accommodate rival predicates. It is only the record of the actual and adopted hypotheses give a fair picture as to why the green predicate is projected from the evidence statements whereas the grue predicate is not projected. A hypothesis is adopted, according to Goodman, when it is more 'credible' than alternative hypotheses and at the time of projection, "it has some undermined cases, some positive cases and no negative cases."[38]

Those predicates are only projectable which are actually projected, adopted and unviolated. The more the predicate has been adopted, the more the degree of its projection. A projectible generalisation is one whose terms are well entrenched in the sense that they have been used frequently in the past generalisation of the sort. This way the projected prediction is entrenched by its repeated adaptation and use in our language. Therefore, "a projection is to be ruled out if it conflicts with the projection of a much better entrenched predicate."[39] On this basis, the prediction of grue is ruled out because it is less entrenched than the predicate green though both are logically well supported by the evidence statement. Thus, based on the principle of entrenchment, Goodman puts forth the rule of induction as follows:

> What distinguishes those recurrent features of experience that
> underlie valid projection from those that do not, is that the former

are those features for which w have adopted predicates that we have habitually projected.[40]

Goodman is trying to provide the r le for validity or at least a sound inductive rule in term of a social institution of language. According to this rule of induction, the prediction of the predicate grue is invalid because it is not in agreement with our past projection. And we know that it does not agree with the past projection because we use a common and a well-understood language. So, projectibility is a matter of the history of the term involved and the use of language in a living society. As language is a social phenomenon, terms get their meaning stipulated by social convention, therefore basically it is the social convention which fixes meaning and gives extension to meaning. The words which are deviant from the established conventions are held to be unwarranted and unprojectable.

AN ASSESSMENT

Gooman takes justifying induction to be a matter of describing, defining and codifying. On this view, we justify a particular inductive inference by showing that it agrees with a valid rule of inductive inference we make and accept. If Goodman's general rule accurately codifies the particular cases by taking into account the entrenchment of predicates, then it is justified on this view and solves the new riddle. Thus he argues that natural kind term like green are projectible because they are well entrenched in our social institution of language. But this provides an inadequate and insufficient solution. Goodman's response to riddle is external, for entrenchment is external to inductive inference. For it refers to our past usage of the same predicates.[41] It is not internal to the properties of the minerals or the method of inference that can provide the necessity and certainty required to avoid unnatural predicate like grue. This is an external and outer-directed question.

The exteral response to answer the riddle is not adequate on two grounds. *First,* the entrenchment of the predicates however strong it may be, constitutes the history of the prediction up to a certain time. It provides nothing more than the accumulated data and is equivalent to the evidence statement. As we have already seen that even the most exhaustive and

comprehensive evidence statement alone is not sufficient to resolve the conflict in the rule-following. Thus it is not the entrenchment that differentiates the valid from invalid projection of predicates. As Hacking argues that it is rather the other way round. We want more than accurate description. In particular, we need to know why the right predicate have become well entrenched while the spurious ones have not. Our habits of induction are the consequences of the fact that they are sound practice. We would have thought that predicates are entrenched because they are projectible, good for induction. "The condition for projectibility is entrenchment."[42] The entrenched predicates, i.e. our actual cases of projection of the predicates. Like the evidence statements the entrenched predicates are not potentially infinite to have any control over the infinitely unlimited applications of the inductive inferences.

Secondly, Goodman's theory of projection will work very well in eliminating the rival predicates, like grue but it has no power in explaining how new hypotheses, like "whale is a mammal" are introduced into our language from the evidence that whale belongs to fish family. To start with, the new predicate has no history of adaptation and entrenchment to support the projection. Therefore, the theory of projection is at best a theory of elimination. The theory of projetion will put an end to the free play of words. The inductive rule, based on our inductive practice cannot really prescribe how a new and valuable theoretical term comes into our language and discipline of study. However, it is said that one can change the very inductive rule to accommodate the useful changes in the use of words. Therefore, the predicate grue is ruled out not only because it violates and less entrenched but aslo because it is less useful. This being so, it is not the simple entrenchment that decides which predction is valid and which one is invalid, rather Goodman is, in fact, speaking of the pragmatic consideration in induction. The theory of projection is only an elimination theory or a theory based on pragmatic principle. On both counts the theory of projection is not fully satisfactory.

By arguing that it is the social entrenchment that decides the meaning, it significantly undermines the importance of the world. Our knowledge is reduced to a set of practices set by the members of the society. It is true

that there is nothing special in the predicate emeralds that decides what will be the colour of emeralds in the futre and helps us to get rid of the unfamiliar and rival predicates like grue. But it sounds very odd to account for our inductive practice in terms of the record of our past projection only. The very activity of justifying induction in the grue-some world is away from philosophical consideration and can become an issue of power politics. This will lead to an utterly a relativistic position, even to contradictory one. Imagine a situation where there are rival and contradictory inductive practices, and we have to map their inductive practices into inductive rules, this will lead to different and contradictory principles of projection. Their projection will be equally entrenched in their practice. The process of mutual adjustment between the inductive practice and inductive rule, as Goodman argues, will give no guidance to resolve the competing claims. The simple description of inductive practices, without some or other discriminatory principle will result in the conflicting projection. Beside, our inductive practices are not always correct. There are some empirical works showing that human being regularly and systematically make incorrect and invalid inductive practice.[43] If Goodman is right, some of our inductive rules, though properly map our inductive practices, are invalid and incorrect.[44]

Hypothesis about natural kinds like green, cannot be generalised on empirical basis. They are projectible because they are rule-governed. Therefore projectible predicates are normative since they are rule-governed and natural terms are entrenched becasue they are part of the form of life. That part is not recognised by Goodman. An external account fails to gap the bridge between the rules and their applications. This is primarily because the solution is based on the assumption that the rules and application are two different issues. On the assumption of the rules, no external relation will work to close the gap for the alleged external factor will require another factor and this will lead to infinite regress. Moreover, the force of the externl factor cannot go beyond the present projection of the predicates. It cannot provide the required necessity to have jurisdiction over the future case. The normativity of the inductive rules can only be accounted internally.[45]

NOTES

1. Goodman, Nelson, *Fact, Fiction and Forecast* (henceforth FFF), 2nd edition, Bobbs-Merrill Co. Inc., Indianpolis, 1965, p. 84.

2. *FFF*, p. 58.

3. *FFF*, p. 60.

4. *FFF*, p. 92.

5. *FFF*, p. 62.

6. Elder, C. L., "Goodman's 'New Riddle' A Realist's Reprise", *Philosophical Studies*, 59, 1990,   p. 115. Also Jackson, F., "Grue", *The Journal of Philosophy*, Vol. 72, 1975, pp. 125-129.

7. Quine, W. V. O., "Two Dogmas of Empiricism", in Ammerman, R. R. (ed.), *Classics of Analytic Philosophy*, Tata McGraw Hill, Bombay, 1965, pp.196-213.

8. Hempel, C. G., *Aspects of Scientific Explanation*, Free Press, New York, 1965, pp.3-51.

9. Popper, K., *Conjectures and Refutations*, Routledge and Kegan Paul, London, 1963, pp. 46 ff.

10. Elder,.C. L. *Goodman's 'New Riddle' - A realist's Reprise*, p.116.

11. *FFF*, p. 74.

12. Our interpretation is markedly different from the common definition of the predicate 'grue'. 'Grue' is defined in the form of "either....or" as follow :

    x is grue =df (x is observed before the time t & x is green) V

    (x is not observed before the time t & x is blue)

    Philosophers who have defined grue in this way are: Barker, S. F. and Peter Achinstein, "On the New Riddle of Induction", *Philosophical Reviews*, Vol. 69, 1960, p. 511, Hacking lan, "On Kripke's and Goodman's Users of 'Grue'", *Philosophy*, Vol. 68, 1993, p. 270, Jackson, 1975, *Grue*, p. 114-119 and Martin, M.R., "It is not that Easy Being Grue", *The Philosophical Quarterly*, Vol. 40, 1990, pp. 300. Also See Elder, *Goodman's 'New Riddle'- A Realist's Reprise*, p. 116.

13. *FFF*, 76.

14. No wonder that the riddle has been interpreted as a form of rule-following scepticism. For a comparative study see, Bhat, P. R. and Sahu G., "The New Riddle of Induction and RuleFollowing", *Journal of Indian Council of Philosophical Research*, Vol. XVI, No. 2, 1999, pp. 25-37. Kripke himself has drawn precise analogy between his "Quus' counter -example with that of Goodman's 'Grue'. For details, see Kripke, S. A. *Wittgenstein on Rule and Private Language*, Harvard University Press, Cambridge, Mass., 1982,pp.20,58-59

15. See Martin, *It is not that Easy Being Grue*, p 299-315 and Barker, S. F. and Peter Achinstein, *On the New Riddle of Induction*, p. 520

16. *FFF*, p. 79.

17. See, Mulhall, S. "No Smoke Without Fire: The Meaning of 'Grue'", *The Philosophical Quarterly*, Vol. 39, 1989, pp. 167-180, Barker, S. F. and Peter Achinstein, *On the New Riddle of Induction*, p. 525 and Hacking, *On Kripke's and Goodman's Users of 'Grue'*, pp.282-84.

18. Mulhill, *No Smoke Without Fire : The Meaning of* 'Grue'", p. 168-172.

19. Hacking, *On Kripke's and Goodman's Users of 'Grue'*", p. 286.

20. Elder, *Goodman's 'New Riddle' - A realist's Reprise*, p. 118.

21. *FFF*, pp. 79-80. Also, Goodman, N., "Positionality and Picture", *Philosophical Reviews*, Vol. 69, 1960, pp. 523-525, defends that positionality cannot be defined against the criticism posed by Barker, S. F. and Peter Achinstein, *On the New Riddle of Induction*, p. 511-522

22. Goodman, N., Safety, Strength and Simplicity", *Philosophy of Science*, Vol.28, 1961, pp. 150-151.

23. Martin, *It is not that Easy Being Grue*, p.308.

24. Martin, *It is not that Easy Being Grue*, p.304.

25. Martin, *It is not that Easy Being Grue*, p.301.

26. *FFF*, p. 80.

27. *FFF*, p. 64.

28. *FFF*, p. 64.

29. *FFF*, p. 60-61.

30. *FFF*, p. 82.

31.   *FFF*, p. 85.

32.   *FFF*, p. 86.

33.   *FFF*, p. 64.

34.   *FFF*, p. 92.

35.   *FFF*, see p. 65, fn. 2.

36.   *FFF*, p. 88.

37.   *FFF*, p. 87.

38.   *FFF*, p. 90.

39.   *FFF*, p. 96.

40.   *FFF*, p. 97.

41.   Hacking, *On Kripke's and Goodman's Users of 'Grue'"*, p. 276.

42.   Hacking, *On Kripke's and Goodman's Users of 'Grue'"*, p. 276.

43.   Kanheman and Trevsky, "Judgement Under Uncertainty: Heuristics and Biases", *Science*, 1974, Vol. 185, pp. 1124-1131 in their empirical study on induction, have shown that there are numerous biased and unreasonable inductive practices we follow.

44.   Stich, S. and R. E. Nisbet, "Justification and the Psychology of Human Understanding", *Philosophy of Science*, Vol. 47, 1980, pp. 188-202. They have explained what kind of invalid inductive rule will be formulated, based on false inductive practices, for example, Gambler's Paradox, regression paradox etc.

45.   For discussion on the internal solution to the riddle see, Bhat, P. R. and Sahu. G., "The New Riddle of Induction and Rule-Following", *Journal of Indian Council of Philosophical Research*, Vol. XVI, No. 2, 1999, pp. 25-37