Eric V. Snow PHL 411 Aristotle Winter term, 1988 4/29/88 Term paper

"Anaxagoras indeed asserts that it is his (man's) possession of hands that makes man the most intelligent of the animals. But surely it is reasonable that it is because he is the most intelligent animal that he has got hands (Parts of Animals, 687a5-9)."[1] Today, Aristotle's teleology, such as expressed in this passage, is dismissed readily by most philosophers and scientists as an outmoded part of the history of ideas. Most modern readers of the evolutionary persuasion will cringe and run for cover from the ideas that seem to be present here. But, actually, when carefully eyed, Aristotle's teleology can prove to be very useful when misunderstandings about it can be cleared away. For by understanding Aristotle's teleology, you can find clues to solving that old philosophical problem: deriving necessity (an "ought") from actuality (an "is").

The reason why Aristotle's teleology has fallen out of such favor with most philosophers and scientists today is that to say all entities, both conscious (men, animals) and unconscious (plants, rocks), serve a purpose or end seems to mean rocks consciously deliberate about what they are going to do. Even Aristotle admits that "It is clear then that chance is an incidental cause in the sphere of those actions for the sake of something which involve purpose. Intelligent reflection, then, and chance are in the same sphere, for purpose implies intelligent reflection (Physics, 197a5-7)." And Aristotle clearly does believe in the universality of purpose (we'll see what this word really means later) in the natural world: "Absence of haphazard and conduciveness of everything to an end are to be found in Nature's works in the highest degree, and the resultant end of her generations and combinations is a form of the beautiful (Parts of Animals,

[1]Quoted from John Randall, Aristotle (Columbia University Press: New York, 1960), p. 237.

645a23-25)." "Moreover, it is impossible that any abstraction can form a subject of natural science, seeing that everything nature makes is means to an end (Parts of Animals, 641b10-12)." Then, since it is clearly ridiculous to attribute consciousness to rocks, stars, and plants, the result is many who cling on to such a belief in the purposiveness of the natural world will think it is imposed from outside the natural order since it clearly couldn't be from within it. (Rocks think? Huh!) So then comes the belief God supplies to and imposes on the natural world a purpose or end for everything in it, since clearly the entities in the natural world aren't always conscious ones. Obviously, Aristotle's teleology, if taken in this light, will strongly appeal to the religiously inclined who believe that an omnipotent God designed and created the whole universe with a purpose in mind, but his teleology will repel those of the humanist/agnostic/atheist camp who hold to some form of Darwinism. In particular, the view that God designed all the universe to serve man's needs only, in one form or another, can be easily ridiculed by any atheist by pointing out the final, biggest problem with Aristotle's teleology if taken from a religious standpoint: verifiability. You can invent without limit, it seems, an endless number of final--and non-falsifiable--causes that can justify and explain anything and everything. The extreme example given by Randall was "that melons are produced with ridges marked on their rind to facilitate division at a family meal . . ."[2] The result of the religious interpretation of Aristotle's teleology is that most, if not all, scientists[3] and philosophers have totally rejected it, and emphasize the efficient cause instead.

But what must be realized was that Aristotle didn't have this caricature just described above in mind at all. He clearly said an entity doesn't have

[2]Randall, Aristotle, p. 227-8.

[3]Newton, although a religious man, was historically one of the most important of these. He felt science's concern should be with the efficient (how?) cause, and left to religion the final (why?) cause.

to be conscious to have an end or purpose by his definition of these words.[4] "It is absurd to suppose that purpose is not present because we do not observe the agent deliberating. Art does not deliberate. If the ship-building art were in the wood, it would produce the same results by nature (his emphasis). If, therefore, purpose is present in art, it is present also in nature. The best illustration is a doctor doctoring himself: nature is like that (i.e. does it on its own, with no outside help) (Physics, 199b26-30)." "Events that are for the sake of something include whatever may be done as a result of thought or of nature (my emphasis) (Physics, 196b23)." "But, secondly, some events are for the sake of something, others not. Again, some of the former class are in accordance with deliberate intention, others not, but both are in the class of things which are for the sake of something (Physics, 196b17-20)." Or, consider this: "This (making of things for the sake of an end) is most obvious in the animals other than man: they make things neither by art nor after inquiry or deliberation (for instance, weaver birds making nests by instinct) (Physics, 199a20-21). Thus, whatever Aristotle does mean by "end," "purpose," or "for the sake of," it certainly isn't exactly the same as what we mean by it. Thus, just like when Aristotle uses the word translated "soul," we have to be careful with interpreting it, the same goes for "end" or "purpose"or "for the sake of which."

Furthermore, the final cause is internal to the natural world, not something imposed upon the natural world by God from outside it: " . . . seeing that everything Nature makes is means to an end. For just as human creations are the products of art, so living objects are manifestly the products of an analogous cause or principle, not external but internal, derived like the hot and the cold from the environing universe (Parts of

[4]Terminology will be the death of philosophy yet!

Animals, 641b10-12)." Aristotle in one of his definitions of "nature" also clearly said it was something internal to entities, not something imposed upon them from the outside by God (as Leibniz did with his monads). "This then is one account of 'nature,' namely that it is the immediate material substratum of things which have in themselves a principle of motion or change (my emphasis, Physics, 193a28-29)." And "nature," for Aristotle, is an end in itself, and isn't serving Somebody Else's purposes: "Again, 'that for the sake of which,' or the end, belongs to the same department of knowledge as the means. But the nature is the end or 'that for the sake of which.' For if a thing undergoes a continuous change and there is a state which is last, this stage is the end or 'that for the sake of which.' (Physics, 194a27-30). Also notice Metaphysics, 996a 22-27. Obviously, Aristotle wasn't trying to say that the reason why rocks fall to the ground was to ultimately serve the glory of Jehovah, but that the end or purpose (be careful with those words!) of nature is within itself and for its own sake alone. So clearly Aristotle's teleology and final cause don't have to be interpreted as a religious doctrine.

Rather, the main point Aristotle is trying to make through his teleology is that what a thing does (its effects) is determined by what it is (its essence, nature or characteristics). For instance, the natural world is organized such that "For a given germ (i.e. seed or fertilized cell) does not give rise to any chance living being, nor spring from any chance one; but each germ springs from a definite parent and gives rise to a definite progeny (hence, elephants give birth to other elephants, not zebras, and an oak tree acorndoesn't grow into a dogwood) (Parts of Animals, 641b27-28)." Or, as Aristotle likes to remind us again and again, it is no "coincidence" man comes from man: " . . . for it is not any chance thing that comes from

a given seed but an olive from one kind and a man from another . . . (Physics, 196a31-32)." Rather, order exists in the universe directly because the essence or nature of entities determine what the entity must of necessity do over time, assuming no other entity interferes: "Moreover, among the seeds anything must have come to be at random (if their view was true--that of Aristotle's opponents). But the person who asserts this entirely does away with 'nature' and what exists 'by nature'. For those things are natural which, by a continous movement originated from an internal (not external, mind you) principle, arrive at some completion (end): the same completion is not reached from every principle; nor any chance completion, but always the tendency in each is toward the same end (notice), if there is no impediment (Physics, 199b13-18). And, as Aristotle also noted, when one event usually or always follows another, it is not a mysterious miracle that order exists in the universe since there is an end product or purpose resulting from its internal principles. If you start out with the same entity, all other things being equal, you will end up with the same results. Hence, all bowling balls will put dents into wooden floors every time they are dropped on them. As Aristotle put it, "But when an event takes place always or for the most part, it is not incidental or by chance. In natural products the sequence is invariable if there is no impediment (outside interfering principle) (Physics, 199a24-25)."

The reason why Aristotle attacks the view that the natural world acts only out of necessity and has no purpose or end, as at Physics 195b39+ and 198b17+, is that the natural world is too orderly for blind "necessity" alone to produce consistent results, because the fact that something is necessary (i.e. must occur) doesn't mean it will be useful to helping some organism live (notice especially 198b34-36 in the Physics). "Necessity" will only produce helpful results to animals by chance, since what is necessary isn't necessarily useful

to something living. There has to be an essence or nature present in an organism that causes it to be orderly enough to live as a result (which is an "end" or "purpose" by Aristotle's definition).

Another problem with the view of talking about blind Necessity (it's blind because its results aren't necessarily useful to something living) is that this view could allow you to get away with not explaining the cause of something happening. Instead, you just assert, "Necessity made this happen," and there your investigation of some phenomenon just ends. "Necessity" then becomes a replacement for a God-centered teleology as an excuse for ending scientific or any other kind of investigation. Instead, you should attempt to find out the internal essence or nature (which is manifested by its "end" or "purpose") of an entity that causes it to create certain effects over time. For "nature" is a cause to Aristotle which should be investigated to see what it causes to happen, for it really is of an entity's essence, and the essence determines the effects an entity will produce: "Of this kind is whatever causes movement . . . and (2) the essence of that which is coming to be, i.e. the form; for this is the end or 'that for the sake of which.' Hence since nature is for the sake of something we must know this cause also (my emphasis, Physics, 198b1-4)." Thus to just assert "Necessity was the cause" can become an excuse to stop investigating and thus ignore the underlying essence that produced the cause you observed. Instead, by noticing entities act for a given end (the result they produce always, or for the most part), you can get a clue to scientifically investigating such entities and gain knowledge about their essence, for scientific knowledge is made up of knowing causes: "Now we do not know a truth without its cause (Metaphysics, 993b23)." "For we think we know only when we have ascertained the causes (Metaphysics, 994b29)."[1] Thus, the final cause can become scientifically use-

[1]Also notice Physics, 194b19-20. Spinoza noted that "the mind perceives things through their primary causes" in the Ethics, Part II, Proposition XVIII.

ful to talk about, if you understand what Aristotle really means by "end" or "purpose" of an entity, which is the unimpeded end result that is caused by its own nature or essence over a period of time.

Of course, the principle reason why Aristotle's teleology has fallen upon such hard times is that it is so easy to read God intervening or causing this or that event to happen into many of the passages in which he discusses it. But, when carefully eyed by an attentive reader, religion will be found to be one of the last things on Aristotle's mind when he wrote these passages. For instance, let's examine Parts of Animals, 641b21-24: "Yet there are some who, while they allow that every animal exists and was generated by nature (my emphasis), nevertheless hold that the heaven was constructed to be what it is by chance and spontaneity; the heaven, in which not the faintest sign of hap-hazard or of disorder is discernable!" It's easy to imagine a medieval Roman Catholic monk bending over a yellowed Latin manuscript exclaiming to himself, after carelessly reading this, "Aristotle is on our side after all." But on careful examination, especially in context, different, non-theistic results emerge. For Aristotle plainly said it is "by nature" the animals were generated, not by God, which sure won't comfort believers in the book of Genesis. The orderliness of the heavens is due to an internal principle that flows from the essence or nature of the entities involved, and not from God moving them directly, for Aristotle had just said before this passage that: "For just as human creations are the products of art, so living objects are manifestly the products of an analogous cause or principle, not external, but internal (my emphasis), derived like the hot and the cold from the environing universe. And that the heaven, if it had an had an origin (note the tentativeness here again), was evolved and is maintained by such a cause (that is, an internal

one flowing from within the universe itself, not from an external cause which would be the Transcendent God), there is therefore even more reason to believe, than that the mortal animals so originated (Parts of Animals, 641b13-18)." Clearly Aristotle's talk of "nature" accomplishing the orderliness of the universe shouldn't be so comforting to a religious believer who wants to read divine purpose into Aristotle's teleology. The same ultimately goes for Physics, 196a27-35 for while Aristotle here ridicules those who think the universe happened by chance but say the animals and plants weren't caused by chance, he doesn't provide a religious explanation for it, but studies into what chance and spontaneity are instead (196b7-8). A sort of religious explanation of an orderly universe (196b5-6), in which "chance is a cause, but that it is inscrutable to human intelligence, as being a divine thing and full of mystery" is quickly brushed aside without comment. Clearly, Aristotle's teleology isn't so favorable to religious interpretations as many (both for and against God creating the universe) like to think it is.

A key concept of Aristotle's in his teleology is hypothetical necessity. Here Aristotle points out that if an entity is going to do or be something, it must have such-and-such an essence or nature in order to accomplish that action or effect. The steel girders and beams in a skyscraper must of necessity be made of a tough, hard material such as steel if they are to support it. Or, to use an inspired classroom example, a saw can't (of necessity) be made up of chopped mushrooms if it is going to cut wood. Let Aristotle explain it: " . . . and there is hypothetical necessity, manifested in everything that is generated by nature as in everything that is produced by art, be it a house or what may. For if a house or other such final object is to be realized, it is necessary that such and such a material shall exist (in actuality--EVS); and it is necessary that first this and then that shall be

produced, and first this and then that set in motion, and so on in continuous succession, until the end and final result is reached, for the sake of which (note the teleology--EVS) each prior thing is produced and exists. As with these productions of art, so is it with the productions of nature. . . . For it is that which is yet to be--health, let us say, or a man--that, owing its being of such and such characters (in actuality--EVS), necessitates the pre-existence or previous production of this and that antecedent; and not this or that antecedent which because it exists or has been generated, makes it necessary that health or a man is in, or shall come into existence (my emphasis, Parts of Animals, 639b25 to 640b8)." Now here you find Aristotle deriving necessity from actuality, though in a sort of reverse way: If something in actuality exists or has some effect, it must of necessity have had the correct nature or essence that enabled it to exist or have that effect. This view contrasts with the converse, which maintains that if you know what an entity's nature is in actuality, you know what it must do of necessity. Nonetheless, Aristotle has found a method for deriving necessity from actuality, thus helping to solve what is now an old philosophical problem. Too bad that since Aristotle's method of deriving an "ought" from an "is" is so closely tied to his teleology because since modern philosophers have rejected his teleology, they have none of Aristotle's help when facing David Hume's assault on the law of causality.

However, Aristotle also uses the others way of getting necessity from actuality mentioned just above (that if something has a given essence or nature or set of characteristics, it must of necessity produce certain effects over time) depending on what kind of science one is talking about. For in Aristotle, you find that natural science covers that "which is to be" is started with and you then derive necessity by looking at the antecedents,

while in theoretical science you have what is (in actuality) and then derive inevitable, necessary results. (See Parts of Animals, 639b33 to 640a2). But Aristotle also went on to notice you can derive necessity from actuality either way, depending on the subject under consideration. "There too it was stated (in previous writing by Aristotle) in what cases absolute and hypothetical necessity exist; in what cases also the proposition expressing hypothetical necessity is simply convertible and what cause it is that determines this actuality (Parts of Animals, 640a10-12)." For it seems that Aristotle also believed that given such and such an antecedent, an inevitable effect will result. "The plan of the house (potentiality), or the house (actuality), has this and that form; and because it has this or that form, therefore is its construction carried out in this or that manner. For the process of evolution is for the sake of (making) the thing finally evolved, and not this for the sake of (making) the process (Parts of Animals, 640a17-18)." Thus if a given end result exists, it (the end result) didn't create the process that led to its own development. Rather, some outside cause created and was the process that led to that given end result. Again, Aristotle, while attacking Empedocles's view that the backbone of a fetus got divided by accident, pointed out that if something actually has a given nature or essence, it must of necessity produce certain end results. "In so saying he (Empedocles) overlooked that fact that propagation implies a creative seed endowed with certain formative properties. Secondly, he neglected another fact, namely, that the parent animal pre-exists, not only in idea, but actually in time. (Thus Aristotle's hypothetical necessity is something that exists outside of arguments and logical symbolism, and so exists in the real world). For man is generated from man; and thus (by necessity) it is the possession of certain characters in the child (Parts of Animals, 640a22-27)." Notice also

Parts of Animals, 641b27, and Physics, 200a30-200b11, where you find the example of the house that "come(s) to be or be (is) there already," showing you can get necessity from actuality either way for Aristotle. The final cause deals with "what it can by nature do or have done to it (Metaphysics, 996b18)." Thus Aristotle gets necessity from actuality by pointing out that the genetic character of what an animal's seed is determines what kind of offspring will necessarily result from that seed, thus producing an orderly universe and banishing chance.

One very important qualification must be inserted here on how what a thing does depends on what it is in Aristotle's teleology. An entity's essence or nature will have a "best result" in which it lives (if alive) and does its own thing, if no accident intervenes to stop the entity's "program" (essence). For instance, if an acorn falls off a tree and a squirrel munches it, the natural end or purpose of the acorn has been thwarted by an accident. If the acorn had been left alone under the right conditions, then it would have inevitably grown into an oak tree, according to its programming (its essence), but never (by necessity) could it have grown into a mushroom, a blade of grass, or an elephant. What a thing is now determines what it can do or be later. Assure as an acorn is an acorn and A is A, an acorn can't produce a zebra. However, Aristotle is careful to note repeatedly that an entity can be "waylaid" by an accident from its intended end (result) which it would have reached otherwise had its essence or nature been allowed to manifest its essence or nature. "For if a thing undergoes a continuous change and there is a stage which is last, this stage is the end or 'that for the sake of which'. (That is why the poet was carried away into making an absurd statement when he said 'he has the end (death) for the sake of which he was born'. For not every stage that is last claims to be an end, but only that

which is best.) (Physics, 194a28-32)." "Further, where a series has a completion, all the preceding steps are for the sake of that. Now surely as in intelligent action, so in nature; and as in nature, so it is in action, if nothing interferes (Physics, 199a9-11)." Note also Physics, 193b14. So for Aristotle the internal principle or nature or essence of an entity would produce certain inevitable, "best" results if that internal principle or "program" wasn't stopped by some external principle[5] from manifesting itself over time until it reaches a given final stage in which that internal principle reaches a climax.

The final cause ultimately deals with "what it can by nature do or have done to is (Metaphysics, 996b18)." It is commonly stated that the final cause is the purpose or end (result) for which some action is done. As Aristotle said himself: "Again (4) in the sense of end or 'that for the sake of which' a thing is done, e.g. health is the cause of walking about. ('Why is he walking about?' we say. 'To be healthy', and, having said that, we think we have assigned the cause.) (Physics, 194b33-35)." And note this: "There is the final cause and there is the motor (efficient) cause. Now we must decide which of these two causes comes first, which second. Plainly, however, that cause is the first which we call the final one. For this is the Reason, and the Reason forms the starting point, alike in the works of art and in works of nature. For consider how the physician or how the builder sets about his work. He starts by forming for himself a definite picture, in the one case perceptible to mind, in the other to sense, of his end--the physician of health, the builder of a house--and this he hold forward as the reason and explanation of each subsequent step that he takes, and of his acting in this or that as the case may be. Now in the works of nature the good end and the final cause is still more dominant than in the works of such as these . . . (Parts of Ani-

[5]This external principle that interferes with some entity's internal principle is in turn the internal principle of some other entity. The squirrel that keeps the internal principle of an acorn from turning into an oak tree is following its own internal principle since it must eat in order to live.

mals, 639b13-22)." Now with the last statement here and the examples Aristotle gave just before it, any red-blooded modern scientist will want to scream, run for cover, and batten down the hatches before listening to any such discussion of final causes.

But is totally discarding Aristotle's teleology advisible because of passages like this? No, because (as Randall emphasizes)[6] Aristotle's teleology never involves a purpose specifically creating a process, like God creating cattle to serve the needs of mankind. But rather for Aristotle the end product must be reached, whether artificial or natural, by a certain necessary process, such as when a star, if it is going to produce heat and light must fuse hydrogen atoms (and helium ones, eventually). For Aristotle, the process serves a "purpose"--an end product--but the "purpose" or end product never creates the process. God's creating the universe in order to glorify himself is an example of a purpose creating the process, but this wasn't what Aristotle had in mind really when discussing the final cause. Rather, in order to accomplish a certain end product or "purpose," you must have a certain process already existing to accomplish it. The individual builder and doctor don't suddenly create from scratch the arts (processes) of building and doctoring. Rather, if a certain end product or "purpose" is to be produced, Aristotle says some process has to exist to accomplish that end product. When Aristotle says, "for the process of evolution is for the sake of the thing finally evolved, and not this for the sake of the process (Parts of Animals, 640a18)," he doesn't mean that God created some process specifically so that His purposes would be accomplished. Rather, Aristotle is saying that to achieve some end result or "purpose," natural or artificial, you must have some process make that "purpose" or end result come about. Thus, the process serves (and is for the

[6]See Randall, Aristotle, p. 329.

sake of) a "purpose" or end result by just causing something to happen or exist since it already exists, not that some Intelligence suddenly created some process specifically to accomplish His purposes or desired end results.

This interpretation becomes clear when Aristotle goes on saying in effect that the nature or essence of an entity becomes manifested through the nature or essence of the process of producing effects: "Empedocles, then, was in error when he said that many of the characters presented by animals were merely the results of incidental occurrences during their development; for instance that the backbone was divided as it is into vertebrae, because it happened to be broken owing to the contorted position of the foetus in the womb. In so saying he overlooked the fact that propagation implies a creative seed endowed with certain formative properties. Secondly, he neglected another fact, namely, that the parent animal pre-exists, not only in idea, but actually in time. For man is generated from man; and thus it is the possession of certain characters (essence) by the parent that determines the development of like characters in the child (Parts of Animals, 640a18-27)." Notice how the "purpose" or end result (the fetus) doesn't create the process that results in itself. Rather, some given process serves that "purpose" or end result since a process of some kind is always necessary to get some result or effect, if the law of cause and effect is true. By using such terminology as "for the sake of," "end," or "purpose," you can get easily mislead by Aristotle's terminology since these terms imply a conscious agent specifically creating some process to bring about the results he or she desires (the purpose). Instead, all Aristotle points out is that if a given end product or "purpose" with a given essence or nature occurs or is accomplished, then you must have had the right process serve to bring it about. For Aristotle, the final cause is the result of the essence or nature and not an essence or

nature imposed upon in order to accomplish a final cause. Notice Physics 198b2-4, in which essence, cause, "nature," and for the sake of something are closely tied together.

For proof of this interpretation of Aristotle, notice carefully Physics 200a30-200b11: "The necessary in nature, then, is plainly what we call by the name of matter, and the changes in it. Both causes must be stated by the physicist but especially the end (or result); for that is the cause of the matter, not vice versa (now it seems Aristotle has put the cart before the donkey here, but read on to find out what he is really talking about); and the end is 'that for the sake of which', and the beginning starts from the definition or essence (notice, again, that the essence is what starts the final cause and not some Conscious Agent coming in with a purpose to create some entity's essence from nothing to accomplish His goals); as in artificial products, since a house is (already) of such and such of a kind, certain things must necessarily (his emphasis) come to be or since health is this, these things must come to be or be there already. (Notice the issue here is that if a given end result is of 'such and such' a kind (essence), necessarily only certain processes of a certain essence or nature will bring it about. What a thing is determines what processes or causes are necessary to make it exist. Planting a chunk of concrete in the ground necessarily will never result in a daisy a month later. It should not be interpreted to mean that since a house exists, it creates a process that brings it about when a conscious agent devises that process to get that end result). Similarly, if man is this, then these; if these, then those. Perhaps the necessary is present also in the definition. For if one defines the operation of sawing as being a certain kind of division, then this cannot (of necessity) come about unless the saw has teeth of a certain kind (essence); and these

cannot be unless it is of iron. (Obviously, Aristotle is talking about how something has to be of a certain essence or nature to accomplish some effect, end result, or goal, and not how the end result or goal imposes upon and creates the essence once the conscious agent sets about trying to achieve that goal). For in the definition too there are some parts that are, as it were, its matter." Again, Aristotle's terminology kills him, at least when it is translated into English and read by a non-religious modern reader. However, if a doctor says the heart "serves" to pump blood, or that the brain "functions" to control the body, or that the pancreas "is for the sake of" making insulin, nobody would misunderstand him as saying that the blood creates the heart, the body the brain, or the insulin the pancreas. Yet, many a modern scientist will run for cover and batten down the hatches when they hear Aristotle saying the final cause exists before the efficient cause (Parts of Animals, 639b14-15) or that the end is the cause of matter (Physics, 200a32), not knowing the definitions of his terms.

The great usefulness of Aristotle's teleology is that it provides justification for the law of cause and effect. For necessity is a key component of this law, yet nobody (it seems) can find a way of deriving this necessity from actuality from an objective, non-mind dependent, external real world. For while Kant rejected David Hume's assault on the law of causality by saying (in effect) that our concept of causality includes necessity and that Hume's view of causality as only correlation or regularity is just plain wrong, because it is too limited, he didn't come up with an objective basis for this view. "All attempts therefore at deriving those pure (sense independent) concepts of the understanding (mind) from experience, and ascribing to them a purely empirical origin, are perfectly vain and useless. I shall not dwell here on the fact that a concept of cause, for in-

stance, contains an element of necessity, which no experience can ever supply, because experience, though it teaches us that after one phenomenon something else follows habitually, can never teach us that it follows necessarily, nor that we could a priori, and without any limitation, derive from it, as a condition, any conclusion as to what must follow."[7] Clearly here, where Kant virtually repeats Hume's famous argument about billard balls, his approach is sadly deficient for a realist like myself. Kant instead maintained in his Critique of Pure Reason that the mind imposes the category (an a priori concept that is innate to the mind) "cause" upon our experience of the world, and that causality has no existence apart from our mind's concept of it, although we constantly experience it. Causality, in Kant's terminology, is empirically real, but transcendentally ideal, which means we experience it necessarily, but it doesn't exist outside our consciousness in the real world. Clearly this isn't a satisfying method for refuting David Hume for a realist. But just how does one go about justifying the law of causality without giving up realism?

By examing Aristotle's teleology, you can derive another approach for justifying the law of causality without having to go to anti-realism to get certainty. For, as Aristotle points out time and time again, in one form or another, what a thing is determines what it will do, or else he says that if something is a given way, certain necessary antecedents must exist for it. Or, to be more philosophically technical, the nature or essence of an entity determines what effects it will produce over time. For instance, Aristotle points out that: "For a given germ (seed or fertilized cell) does not give rise to any chance living being, nor spring from any chance one; but each germ springs from a definite parent and give rise to a definite progeny (Parts of Animals, 641b27)." "For instance, we say that food is necessary;

[7]His italics, Immanuel Kant; translator, F. Max Muller, Critique of Pure Reason (Anchor Books: Garden City, New York, 1966), p. 107-8.

because an animal cannot possibly do without it. This third mode is what may be called hypothetical necessity. (If something is to occur as an effect, certain conditions of causes must be fulfilled to bring it about. And if these conditions or causes are attained, the effect must follow necessarily and inevitably, all other things being equal). Here is another example of it. If a piece of wood is to be split with an axe, the axe must of necessity be hard, and, if hard, must of necessity be made of bronze or iron. Now exactly in the same way the body, which like the axe is an instrument--for both the body as a whole and its several parts individually have definite operations for which they are made--just in the same way, I say, the body, if it is to do its work (produce an effect), must of necessity be such and such a character (made up of a certain essence or nature), and made of such and such materials (Parts of Animals, 642a8-13)." "For teeth and all other natural things either invariably or normally come about in a given way; but of not one of the results of chance or spontaneity is this true. We do not ascribe to chance or mere coincidence the frequency of rain in winter, but frequent rain in summer we do (attribute to chance); nor heat in the dog-days, but only if we have it in winter. (Since summer by nature or essence is hot, it isn't 'chance' that a given summer day is hot). If then, it is agreed that things are either the result of coincidence or spontaneity, it follows that they must be for an end (which is the end result of the essence or nature of the entity over time); and that such things are due to nature (not God and His mysterious ways) . . . (Physics, 198b35-199a6)." Thus the effect is produced by the essence or nature of an entity (compare Physics, 198b2-3).

In turn, the ultimate basis of why what a thing does is determined by what it is is that the law of causality is based on the law of non-contradiction.

For the reason why an axehead will be tough and hard tomorrow, all other things being equal if it is tough and hard today is that entities don't act against their own natures, but follow them instead. A bowling ball, if dropped to the ground, all other things being equal, cannot of necessity, act the same way a basketball would. A basketball can't act the same way a bowling ball would because they have different essences, and thus must of necessity act differently. The law of causality is nothing more than an entity's nature acting over time. The law of non-contradiction tells what is impossible in a given instant of time for some entity. The law of causality tells what is impossible over a period of time for the same entity. As the authors of Classical Apologetics put it: "Causality is established on a more firm foundation if it is seen as an axiomatic corollary of the law of noncontradiction. In a sense the law of causality is merely an extension of the law of noncontradiction; it is a formal principle which is analytically true."[8] An entity will not and cannot act against its own essence or nature. A pillow will never feel like a boulder, ceteris paribus. As Ayn Rand put it: "The law of causality is the law of identity applied to action. All actions are caused by entities. The nature of an action is caused and determined by the nature of the entities that act; a thing cannot act in contradiction to its nature. An action which would mean a zero controlling a thing, a non-entity controlling an entity, the non-existent ruling the existent . . . "[9] Thus the law of noncontradiction over time is the basis for the law of causality.

Or, consider how Nathaniel Branden put it: "The actions possible to an entity are determined by its nature: what a thing can do, depends on what it is. It is not 'chance,' . . . it is in the inexorable nature of the entities involved. That a seed can grow into a flower but a stone cannot--that a bird

[8]R. C. Sproul, John Gerstner, and Arthur Lindsley, Classical Apologetics (Zondervan: Grand Rapids, Michigan, 1984), p. 83.

[9]Ayn Rand, Atlas Shrugged (New American Library: New York, 1957), p. 926.

can fly, but a building cannot--that actions consistent with their nature are possible to entities, but contradictions are not. Just as what a thing can do, depends on what it is--so, in any specific situation, what a thing will do, depends on what it is. If iron is exposed to a certain temperature, it expands; if water is exposed to the same temperature it boils, if wood is exposed to the same temperature, it burns. The differences in their actions are caused by differences in their properties. If an automobile collides with a bicycle, it is not 'chance' that the bicycle is hurled into the air, rather than the automobile; if an automobile collides with a train, it is not 'chance' that the automobile is hurled into the air, rather than the train. Causality proceeds from identity. Causality pertains to a relationship between entities and their actions (not just actions and reactions)."[10]

Of course, one major element in all this analysis above is a huge ceteris paribus clause hangs over whatever results you say you have certainty about due to the law of cause and effect producing consistent results for the future. Human ignorance of entities' natures will inevitably catch us off guard again and again, which is why science's conclusions always have to be revisible. We have to strive for rational certainty ("this is true so far as I can tell"), not 100% certainty, in science if we are going to be sensible, since we will never know everything about various entities that we can examine. A typical example of such changes is that at one time we used to think atoms were solid little balls, but now we think they are mostly empty space with a nucleus at the center of a few electrons scattered in the empty space. The fact that the sun rises each morning necessarily according to the way things are right now doesn't preclude a huge glob of antimatter hitting the earth tonight. Thus, a ceteris paribus--"all other things

[10]Nathaniel Branden, The Psychology of Self-esteem (Bantam Books: New York, 1969), p. 58.

being equal"--clause concerning human ignorance has to be always inserted in our analysis of causality above.

Another problem that looms on the horizon for my analysis above is quantum mechanics' built-in uncertainty. But my analysis above I limit to the higher level systems, for it is very clear that causality and certainty exist above, even if chaos (allegedly at least) reigns on below. The sun rises each morning, rocks always fall to the ground, winter follows summer, and thunder is heard after lightning. Apparently, the uncertainty of electrons' motions get "statisticalized" away in higher level systems, as per the central limit theorem, since the world I live in doesn't strike me as an incomprehensible chaos. So I don't think my analysis is subverted too much by the findings of quantum mechanics if I am careful to limit it to large groups of atoms in higher level systems where the uncertainty concerning their motions gets almost entirely eliminated. Also, there is the possibility of questioning some of quantum mechanics's basic theory. As Stanley Jaki pointed out: "Both (Werner Heisenberg and Niels Bohr) took a basic consequence of quantum mechanics about the impossibility of measuring certain interactions with complete accuracy for the justification of the following proposition if not plain somersault in logic: an interaction that cannot be measured exactly, cannot take place exactly. And in the same breath they began to celebrate the demise of causality, with the consequent enthronization of chance."[11] It could be, as the physicist Max Planck thought, the explanation to the electrons' movements is an epistemological (knowing) problem, that "this unpredictable electronic quantum movement is inexplicable to us at least, at this time, rather than unknowable in its nature."[12] So, either way, whether quantum mechanics could be questioned altogether concerning its uncertainty principle, or whether it becomes fundamentally irrelevant to everyday experience

[11]Stanley L. Jaki, The Savior of Science (Regenery Gateway: Washington, D.C., 1988), p. 111.
[12]Sproul, et al., Classical Apologetics, p. 112.