

Analogical Arguings and Explainings*

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The thesis defended below is that the arguments associated with many common uses of analogy in reasoning have a simple, valid deductive structure. These uses of analogy are not properly accommodated by accounts of analogy in which the associated arguments have an inductive (Mill 1889), abductive (Peirce 1960), or eductive (W.E. Johnson 1964) structure. In this discussion I will stress the distinction between the activity of arguing and the passive entity which is the associated argument. For several of the examples discussed below we shall find analogies “in” arguings but not “in” their associated argument. This should not be surprising. Often, analogical reasoning is indirect reasoning. It is similar to ironic reasoning. If someone announces a premise ironically, it would be a mistake to say that irony did not play a role in the reasoning, but the irony will not show up in the associated argument.

1. Analogical arguings

Arguings are activities involving an arguer and an audience: the arguer uses claims to persuade the audience to accept a claim. With any arguing there is an *associated argument* consisting of an n-tuple of sentences or sets of sentences. Arguings are fundamental; arguments are parasitic on

arguings. The arguments extrapolated from arguings are passive “things.” If I try to convince you that it is cold by pointing to the thermometer, I am arguing. From this arguing we can extract the passive argument, the ordered pair $\langle\{T\}, C\rangle$, where T is the claim, say, that it is 5 below, and C is the claim that it is cold. (For more discussion of this terminology and subsidiary notions, see (F. Johnson 1980) and (F. Johnson 1984).)

An *analogy* is a claim that certain things are like certain other things (whether or not the former things belong to the same class as the latter, that is, whether the analogy is literal or figurative). If an analogy, x is like y, is used in an arguing then x is the *base* (*source, phoros*) and y is the *target* (*theme*), or vice-versa. (The arguer expects his or her audience to be more familiar with the base than with the target.) An *analogical arguing* is an arguing in which an analogy plays an essential role. And an argument is an *associated analogical argument* if it is associated with an analogical arguing.

1.1 *HC analogical arguings*. No one will deny that the following example is an analogical arguing; the debate concerns its analysis.

Example L

The famous chemist and biologist, Justus von Liebig, dismissed the germ theory with a shrug of his shoulders, regarding Pasteur’s view that microbes could cause fermentation as ridiculous and naive as the opinion of a child “who would explain the rapidity of the Rhine current by attributing it to the violent movement of the many millwheels at Maintz.” (Exercise from Copi 1986, p. 401)

There are three steps in Liebig’s arguing, which is a paradigm case of an analogical

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arguing with a hidden conditional, an *HC analogical arguing*.

Structure of an HC analogical arguing

Step 1. (Analogy Step) The author thinks there is an analogy between B, the base, and T, the target. (In Example 1 the relationship between the movement of the millwheels at Maintz and the movement of the Rhine is the base of the analogy and the relationship between the movement of certain microbes and a certain fermentation process is the target of the analogy.)

Step 2. (Analogy-to-Conditional-Step) The author expects the audience to recognize that by using the analogy in Step 1 he or she is asserting a conditional sentence with the following form: 'If T, or some portion of T, has, or does not have, some feature F, then (In Example L the conditional sentence is 'If microbes are the cause of the fermentation process then effects are causes.'

Step 3. (Inference Step) The author expects us to draw the conclusion (C) from the conditional sentence (major premise, Mp) in Step 2 by supplementing the conditional with the denial of this conditional's consequent (minor premise, mp). The associated argument is <{Mp, mp}, C> argument. (For Example L the associated argument is: <{If microbes are the cause of fermentation then effects are causes, Effects are not causes}, Microbes do not cause fermentation>, an instance of *modus tollendo tollens*.)

Perhaps the most sensitive spot in this analysis involves the relationship between the first and second steps. There is a temptation to complicate the analysis of the associated argument by making room for

a claim about the base of the analogy which gives evidence for (induces? abduces?) the conditional sentence. I resist this temptation. According to the HC analysis the analogy is a means of presenting the major premise of the associated argument, but is not itself a premise of the associated argument.

This is another argument of an HC arguing:

Example R

This [further official statement] explained that *The Satanic Verses* had been banned as a pre-emptive measure. Certain passages had been identified as susceptible to distortion and misuse, presumably by unscrupulous religious fanatics and such. The banning order had been issued to prevent this misuse.... This really is astounding. It is as though, having identified an innocent person as a likely target for assault by muggers or rapists, you were to put that person in jail for protection. This is no way, Mr. Gandhi, for a free society to behave. (Salman Rushdie, *Rocky Mountain News*, Feb. 27, 1989, p. 41)

The HC analogical arguing in Example R consists of the following steps:

Step 1. (Analogy Step) Rushdie thinks *The Satanic Verses* (the target) is like an innocent person who is a likely victim of muggers or rapists (the base).

Step 2. (Analogy-to-Conditional-Step) Rushdie thinks that by using the analogy in Step 1 we will recognize the truth of this conditional: 'If it is right to ban *The Satanic Verses* then the possible misuse of something by someone provides sufficient justification for isolating this thing.'

Step 3. (Inference Step) Rushdie thinks that we will infer the denial of the antecedent of the conditional in Step 1 (the conclusion) from this conditional together with the denial of its consequent.

The associated argument in Rushdie's analogical arguing is:

1. (Major premise) If it is right to ban *The Satanic Verses* then the possible misuse of something by someone is sufficient justification for isolating this thing.
2. (Minor premise) The possible misuse of something by someone does not *per se* justify the isolation of this thing.
3. (Conclusion) It is not right to ban *The Satanic Verses*.

1.2 Inductive analogical arguings. Jevons presents what I think of as being the common analysis of analogical arguments. He says:

Argument from analogy may be defined as direct inductive inference from one instance to any similar instance. It may, as Mr. Mill says, be reduced to the following formula:—‘Two things resemble each other in one or more respects; a certain proposition is true of the one; therefore it is true of the other.’ (Jevons 1957, p. 227)

Jevons is talking about what we shall call a *simple inductive analogical arguing*, consisting of the following steps:

1. (Analogy Step) The author thinks that base B is like target T in virtue of sharing properties P_1 , P_2 , ...
2. (Base Step) The author thinks that base B has property Q, not included among the P_i 's.
3. (Target Step) The author expects the audience to infer that T has Q, given the propositions embedded in Steps 1 and 2.

The associated argument in a *simple inductive analogical arguing* is the ordered pair $\langle \{B \text{ and } T \text{ share properties } P_1, \dots, (Mp), B \text{ has } Q (mp)\}, T \text{ has } Q (\text{conclusion}) \rangle$.

Of course, we cannot be sure that Jevons would view Examples L and R as simple inductive analogical arguings. But, given the context in which Example L is cited in (Copi 1986), we can be quite sure that Copi thinks that this is the associated argument:

1. (Major premise) The relationship of the movement of the millwheels

(mm) to the movement of the Rhine (mr) is like the relationship of microbes (m) to fermentation (f).

2. (Minor premise) mm is not a cause of mr.

So, 3. (Conclusion) m is not a cause of f.

Given this identification of the argument in Example L, we are drawn into such questions as whether dissimilarities involving the large number of microbes involved in the fermentation process and the small number of millwheels at Maintz involved in the Rhine's current affect the value of the argument. Is the dissimilarity relevant? What other dissimilarities are there? What other similarities are there? To focus on these questions is to fail to appreciate Liebig's reasoning.

Similar thoughts apply to Example R. According to those who view it as a simple inductive analogical arguing the associated argument is:

1. (Major premise) *The Satanic Verses* (the target) and an innocent person (the base) share properties P_1, \dots (have an identity?, have intrinsic value? ...)

2. (Minor premise) An innocent person (the base) should be allowed to circulate freely.

So, 3. (Conclusion) *The Satanic Verses* (the target) should be allowed to circulate freely.

But this analysis seems misguided. The criticism of Rushdie's argument should not focus on similarities and dissimilarities between Rushdie's book and innocent persons who are targets for muggers or rapists. Does the fact that persons are literally alive and books are not weaken Rushdie's argument? To consider this question shows that we have misunderstood Rushdie's reasoning. Our interest in Rushdie's reasoning pertains to his contention that the possible misuse of something by someone does not provide *per se* a reason for isolating it.

When evaluating HC arguings we do not look at similarities or dissimilarities between

the base and the target. Rather, we ask whether the base clearly announces the conditional, and whether the premises of the associated argument are true.

1.3 Choosing an analysis. I am not saying that all uses of analogy in reasoning are appropriately analyzed as HC analogical arguyngs. Though the analysis fits Examples L and R perhaps other uses of analogy are to be analyzed in other ways. Consider so-called refutations by analogy. The refuter asserts that argument X (the base) is like argument Y (the target), that X is obviously invalid (since its premises are true and its conclusion is false), and expects us to conclude that Y is invalid. An HC analysis of the reasoning looks like this:

1. (Analogy Step) The refuter thinks that argument X is like argument Y.
2. (Analogy-to-Conditional Step) The refuter thinks that given the Analogy Step the audience will recognize that if Y is not invalid then it is possible for an argument with true premises and a false conclusion to be valid.
3. (Inference Step) The refuter expects the audience to infer that Y is invalid, given the conditional in Step 2 and the denial of this conditional's consequent.

I am not certain that the HC analysis of the refutation is the correct one. But it is an interesting alternative to the standard textbook analysis of such refutations, which has been trenchantly criticized by Massey. See (Massey 1980, pp. 319-320) and the references at the end of his paper.

Or consider this use of a literal analogy in reasoning: 'This apple is like that apple since they came from the same tree. This apple (the base) has a worm hole. So that apple (the target) has a worm hole.' It would be a mistake to give this reasoning any structure other than its superficial structure. In particular, I resist the HC analysis, according to which the following argument is embedded in the reasoning:

1. (Major Premise) If that apple does not have a worm hole no apples on the tree

have worm holes.

2. (Minor Premise) This apple on the tree has a worm hole.
3. (Conclusion) That apple has a worm hole.

I also resist giving the argument associated with the reasoning the following complex structure:

1. This apple on the tree has a worm hole.
- So, 2. All apples on the tree have worm holes. (By induction)
3. That apple is on the tree.
- So, 4. That apple on the tree has a worm hole. (By deduction, from 2 and 3)

Russell correctly notes that if the reasoning is construed in this way it is weaker than it would be if the generalization step (step 2) were bypassed. See (Russell 1959 p. 80) and also (W.E. Johnson 1964, vol. 3, p. 44).

2. Analyses similar to the HC analysis

2.1 Levi's analysis. In (Levi 1948) we can find what we are calling the HC analysis of reasoning. Levi says:

The basic pattern of legal reasoning is reasoning by example. It is reasoning from case to case. It is a three-step process described by the doctrine of precedent in which a proposition descriptive of the first case is made into a rule of law and then applied to a similar situation. The steps are these: similarity is seen between cases; next the rule of law inherent in the first case is announced; then the rule of law is made applicable to the second case. (pp. 1-2)

Suppose, for example, judge j argues that plaintiff p should be compensated for damages. The analogical arguing of the judge is that p's case is like q's. The judge extracts a principle P (whenever x is in state y, x should be compensated for damages) from q's case (the base) and expects that his or her audience will recognize P in the base. So, the argument associated with j's analogical arguing on the HC analysis is:

1. (Major premise) If p is not compen-

- sated for damages, then principle P is violated.
2. (Minor premise) Principle P should not be violated.
 - So, 3. (Conclusion) p should be compensated for damages.

2.2 Aristotle's analysis. Levi traces his analysis of legal reasoning to Aristotle. We quote the passage Levi refers to, giving Ross's translation (Ross 1980, p. 487):

It is an example when the major term is shown to belong to the middle term by means of a term like the middle term. We must know beforehand both that the middle term is true of the minor, and that the major term is true of the term like the minor. Let A be evil, B aggressive war on neighbors, C that of Athens against Thebes, D that of Thebes against Phocis. If we want to show that C is A, we must first know that B is A; and this we learn from observing that e.g. D is A. Then we have the syllogism 'B is A, C is B, Therefore C is A.' (*Prior Analytics*, 68^b38-69^a6)

The HC analysis of the reasoning in Aristotle's example is as follows:

1. (Analogy Step) The arguer asserts that a war by Athens on Thebes is like a war by Thebes on Phocis.
2. (Analogy-to-Conditional Step) The author uses the Analogy Step to assert that if a war by Athens on Thebes is not evil then wars against neighbors are not evil.
3. (Inference Step) The author expects his or her audience to infer that a war by Athens on Thebes is evil from the conditional sentence in Step 2 together with the denial of the consequent of this conditional: Wars against neighbors are evil.

Aristotle's analysis of the reasoning is not exactly like the HC analysis. For him the associated argument has the form of Barbara (All aggressive wars against neighbors are evil; all aggressive wars by Athens on Thebes are aggressive wars against neighbors; so all aggressive wars by Athens on Thebes are evil) instead of *modus tollendo tollens*. But the similarity of the analyses

is strong. Rather than taking the base at face value (as in a simple inductive analogical arguing) the base is related to the "rule" that all wars on neighbors are evil.

But how is the base related to the rule (principle)? Well, the rule inheres in the base. But in what sense? The commentators do not agree about the interpretation of Aristotle's remarks. Smith says that the base *establishes* the rule. When commenting about the above passage he says:

...to prove that war with the neighbouring Thebans would be evil for the Athenians... we first offer a familiar example (the war of the Thebans with their neighbors the Phocians was an evil for them) to *establish* the principle 'war with one's neighbors is an evil' and then apply this to the particular case at hand. (Smith 1989, p. 222, my italics)

Ross would not agree with this use of 'establish.' Ross says:

Its real interest [the real interest of argument by example (analogy)] is not like that of science, in generalization, but in inducing a particular belief, e.g. that a particular aggressive war will be dangerous to the country that wages it. (Ross 1980, p. 488)

Ross is right. Ross believes that the base does not *establish* the principle; rather, the base is used to get the audience to recognize the principle. The principle inheres in the base in the way in which the Pythagorean Theorem inheres in a particular triangle. The triangle does not give evidence for the theorem, but one can get the belief that the theorem is true by observing the triangle.

For another example of inference consider the following non-analogical arguing:

I was so surprised to see your definition of Halloween as 'All Hallows Evening.' ...It therefore follows that Christmas Eve is the evening of Dec. 25. (Virginia Owens, quoted in William Saffire's *You Could Look It Up*, New York: Henry Holt, 1988, p. 103)

That Virginia Owens was surprised is not a part of the argument associated with this arguing. From her comments about herself we recognize that she is asserting that it is

a mistake to say that Halloween is the evening of All Saints' Day (All Hallows' Day, November 1). Given the notion of inference under discussion, we can say that her impersonal remark *inheres* in her personal remark.

It is surprising that Aristotle's general characterization of argument by analogy (example) seems to be restricted to literal analogies. For, it is common for arguers to use figurative analogies to elicit principles that inhere in the base of the analogy. Aristotle says:

Example, then, is inference from part to part, when both *fall under the same class* and one is well known. Induction reasons from all the particulars and does not apply the conclusion to a new particular; example does so apply it and does not reason from all particulars. (Ross 1980, p. 488, my italics.)

Consider Rushdie's "inference from part to part" in which one of the parts (innocent persons) is "well known." Do the parts fall in the same class? The natural answer is no. One part is in the class of human beings and the other is not. But perhaps what Aristotle means by saying the parts belong to the same class is that the principle elicited by the one of the parts (the base) applies to both parts. If this is what he means then it is true that the base and the target in an HC arguing belong to the *same class*.

3. More examples of HC arguing

Example M

One does not need to search for pathology to explain career choice any more than one needs underlying scatological or sexual explanations to understand every innocuous bit of behavior. Altruistic people, who work hard to help others, should not be suspected *ipso facto* of harboring ulterior selfish motives. (Thomas Maeder, "Wounded Healers," *The Atlantic Monthly*, Jan., 1989, p. 37)

The HC arguing is:

1. (Analogy Step) Maeder thinks that the reasons people make career choices (the

target) are like the reasons people do "innocuous things," choose blue over beige cars, choose to put kiwis instead of cherries on their cheesecake, etc. (the base).

2. (Analogy-to-Conditional Step) Maeder uses Step 1 to get us to recognize that if people who make career choices should be suspected *ipso facto* of harboring ulterior selfish motives then the reasons for "ordinary" choices are tainted.
3. (Inference Step) Maeder expects us to infer that the denial of the antecedent of the conditional in Step 2 follows from this conditional together with the denial of its antecedent.

Example A

Legislation to outlaw liquor in the '20s didn't work, and attempts to ban drugs obviously haven't been effective. *Time's* proposals would create an even bigger black market and make a criminal of the average citizen. Thank God for the National Rifle Association. (John Armanini, *Time*. Feb. 27, 1989, 'Letters to the Editor.'

This example is Armanini's complete letter, short, but interesting. Note that the conclusion and the base for the analogy are implicit. And note that Armanini is arguing both analogically and non-analogically. The second sentence is not a part of the analogical arguing indicated by the first. And note that the final conclusion, that guns should not be banned, is implicit and is derived from the implicit, mediating conclusion, that those who try to ban guns will not succeed. We give an HC-analysis of the analogical arguing:

1. (Analogy Step) Armanini thinks that the banning of guns (the target) is like the banning of liquor and drugs (the base).
2. (Analogy-to-Conditional Step) Armanini expects the audience to recognize that if the banning of guns will be successful then in general a society will succeed in abolishing the use of x by legislation.
3. (Inference Step) Armanini expects us to infer the denial of the antecedent of the conditional in Step 2 from this conditional together with the denial of its consequent.

4. HC explainings

Given the similarity of arguings and explainings, we can expect that the HC analysis will be suitable for at least some explainings. And it is. We turn to this topic not only to say something about explainings, which are typically slighted in the textbooks, but to improve our fix on the HC analysis of arguings.

By an *explaining* we mean an activity in which the author is using claims to help the audience understand a claim whose truth the author thinks the audience accepts. An *analogical explaining* is an activity in which an analogy is an essential ingredient in the explaining. With any explaining there is an associated explanation, though the relationship between the explaining and the associated explanation may not be direct.

Example P

Only Ireland has no divorce law at all, a proposed bill having recently been defeated in a referendum by a combination of the Roman Catholic Church and fearful Irish women. During the referendum, an opponent observed that "a woman who votes in favor of divorce is like a turkey voting in favor of Christmas." (Roderick Phillips, *New York Review of Books*, March 2, 1989, p. 12)

It seems to me that anyone who evaluated this explanation by discussing the similarities between women and turkeys would be misunderstanding the role of the analogy in the explaining. This is an HC analysis of the explaining:

1. (Analogy Step) Phillips asserts that a turkey's desire that humans celebrate Christmas in the traditional way (the base) is like an Irish woman's desire that divorce be legalized.
2. (Analogy-to-Conditional Step) Phillips expects us to recognize this conditional, given the Analogy Step: If Irish women had voted for legalizing divorce they would have wanted to bring about their

own demise.

3. (Explanation Step) Phillips expects the audience to use the conditional in Step 2 to generate the following explanation:

Explanans: Conditional in Step 2.

Explanans: Irish women did not want to bring about their own demise.

Explanandum: Irish women did not vote for legalizing divorce.

Example S

What can make cities work again, runs the cheerfully contrarian thesis of urban researcher William H. Whyte is not less congestion but more. Not monorails, fortress office towers and sanitized fourth-floor skyways between buildings, but hot-dog carts, jostling sidewalk crowds, street musicians, handbill passers, eccentrics, arm-waving conversationalists, three card monte scamsters and girl-watching construction workers. Winos snoozing. Bag ladies muttering. ... The reader takes in this sedition with a widening grin, as if a doctor were telling him to lay off oat bran, a dangerous spiritual depressant, and start packing in butter fried-eggs and thick steaks. (John Skow, *Time*, Feb. 27, 1989, p. 78)

Of course, Skow is not trying to prove that anyone who hears Whyte's advice will be skeptical. He is sure that Whyte's audience will be skeptical. The explanation embedded in the HC explaining can be arranged as follows:

Explanans: If people did not react skeptically to Whyte's beliefs then people would not react skeptically to beliefs that are contrary to the society's well-entrenched beliefs.

Explanans: People react skeptically to beliefs that are contrary to the society's well-entrenched beliefs.

Explanandum: People react skeptically to Whyte's beliefs.

Example N

We think the surface of the earth is like a coffee percolator. As in a coffee percolator, the input of heat is essentially continuous. Because of poor conduction through the continents, however, the heat is released in relatively sudden bursts. (R. Damian Nance, et al., *Scientific American*. July, 1988, p. 72)

This is an HC analysis of the passage:

1. (Analogy Step) Nance asserts that the eruptions of a coffee percolator (the base) are like the eruptions of the earth's surface (the target).
2. (Analogy-to-Conditional Step) Nance expects the audience to draw a conditional of the following form from the Analogy Step: If the earth did not erupt in the manner in which it does then we would have to deny that whenever x is heated and has characteristics C then x will behave in way w.
3. (Explanation Step) Nance uses the conditional in Step 2 together with the implicit *explanans* that the earth is heated and has characteristics C to explain the eruptions at the earth's surface.

From the passage cited we cannot be sure which characteristics, C, Nance has in mind. But we can be confident that to complete his reasoning we need to determine what these characteristics are. And we can be confident that anyone who criticizes the reasoning by finding dissimilarities between coffee percolators and the earth's surface is on the wrong track.

5. Summary

For many, though not all, uses of analogies in arguings and explainings, the HC analysis is better than the induction analysis. The HC analysis cuts across the literal/figurative distinction—Aristotle's analogy is literal and Rushdie's (Example R) is figurative. The roots of the HC analysis are in the *Prior Analytics*. When analyzing uses of analogy in reasoning, we should at least consider the HC analysis and thus look for the conditional sentence inherent in the analogy. If the HC analysis is the correct one to choose, then the associated argument has a simple deductive structure.

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