Positional Paper on Reasoning Terminology

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W. Clifton Adams

Abstract

In stating my position on reasoning, this paper identifies two origins of the confusion that undermine the understanding of reasoning. My position is built on a view of the induction-deduction spiral and five types of propositions. Based on this position, the paper discusses my analysis of the reasoning/argumentation definitions present in current, mainstream speech-communication texts.

Key Words: Induction, Deduction, Types of Reasoning, Speech-Communication Texts, Research Processes

Definitions are the start of understanding. Quality definitions are essential for coherent, consistent and parsimonious understanding.

My desire was to unravel the tangle that constituted the mainstream instruction on reasoning within speech-communication textbooks. I had no expectation of accomplishing this task even to my own satisfaction; however, in identifying two of the origins of the tangle, perhaps I have provided encouragement for others to join the task. At a minimum, I established a baseline for analyzing the treatment of reasoning. In charting this baseline, I articulated, below, my position in two areas: (1) the inductive-deduction spiral; and (2) types of propositions.

The Inductive-deductive spiral

Aristotle provided a clear and useful treatment of the inductive process. John Stewart Mill, among many others, advanced the understanding of how induction should work in a scientific process. As a general concept, induction is learning from experience, generalizing principles from observations. It involves an inference that if a relationship between and/or among events has occurred consistently, or even with an established probability, under certain conditions, the relationship is likely to occur under those conditions in the future, probably with the same consistency. As Ziegelmuller and Dause (1975) informed us, induction is based on the verity that seems to be inborn termed *assumption of uniformity (p. 87)*. In short, then, induction is said to be reasoning from specific to general; it is noting similarity among a series of events and forming a conclusion concerning this similarity. The scientific formulation of this process demands controls to insure the correctness of both the data collected and the conclusions reached. However complicated the scientific aspects may render the process, the essence of the definition is clear. The same cannot be said for deduction.

Aristotle's discussion of deduction began the wind that produced the tangle. His deduction was the application of a categorical verity to an entity included in the category. What was true of the category had to be true of the particular entity to which it was applied. So, deduction was distinguished from induction in two ways: (1)

deduction was the reverse process of induction; it was moving from a general principle to a specific conclusion. And, (2) there was no inference involved; it was an absolute. The process demanded a blanket existential assumption (Copi, 1982). According to Copi (1982), "Modern logicians decline to make blanket existential propositions, even though this means this decision forces them to give up some of Aristotelian logic."

In the non-Aristotelian differentiation, an inferential characteristic is recognized in deduction. The idea that induction and deduction are both inferential and distinguishes themselves only in the reverse nature of their respective process dates back at least to William Whewill. He identified the inferential nature of both phases of reasoning, deduction as well as induction. In "Two Principles Processes by which Science is Constructed," of his *Philosophy of the Inductive Sciences,* written in the 1840's and 50's with a three-volume version published in 1857, he stated. "When this step [induction] is once made, it becomes possible to deduct from the truth thus established, a train of consequences often in no small degree long and complex. The process of making these inferences may properly be described by the word Deduction" (Whewell, 1984; p. 317-318).

Deduction need not be absolute. Indeed, an inference is at the heart of any reasoning: When we reason, we infer some bridge between an idea we think we know already and another idea of which we are less sure. We then conclude the probable truth of the second idea. In induction, the inference is the basic assumption about order in the universe. In deduction, the inference is based on some general principle gained either through induction, education (in a broad sense of the word) or both.

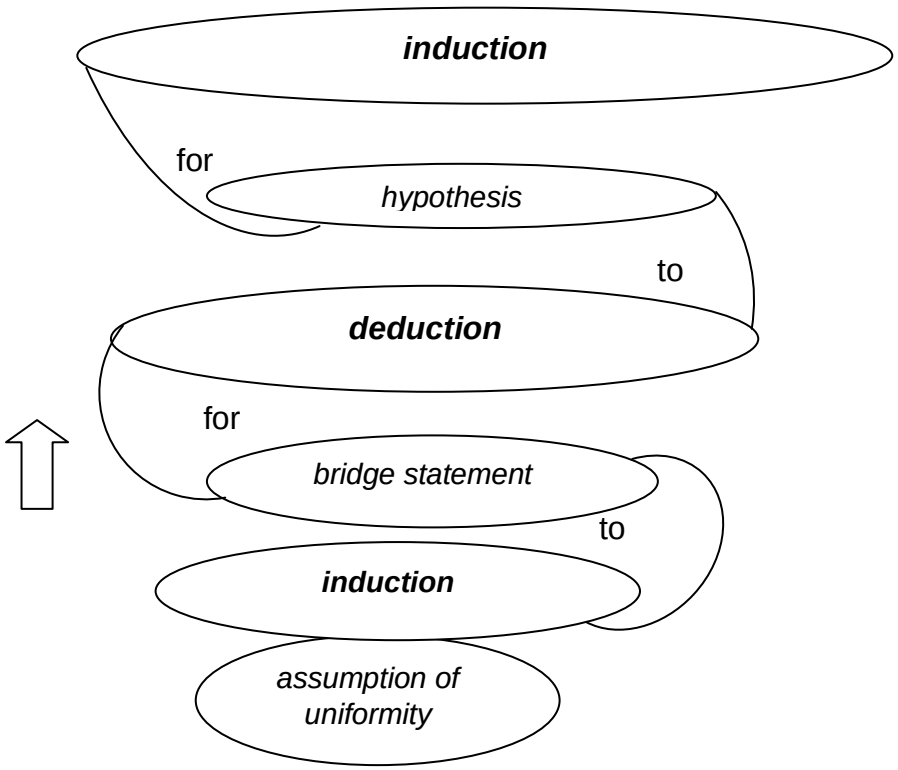
The two phases of reasoning interconnect in what is best termed a spiral. Induction leads to a bridge statement that is, in turn, the basis for deduction that leads, particularly in the scientific community, to a hypothesis that directs induction (see figure 1). Adding "bridge statement" and "hypothesis" helps to punctuate the two phases as they spiral to create an understanding of our world. However, the addition of the two words should not prompt one to conclude that they represent different reasoning processes, as it did for Charles Pierce with the hypothesis in his "abductive reasoning."

Cattell (1988) broke the spiral down to the inductive-hypothetico-deductive research method. Again, it would be clearer for students of research as well as reasoning to think in terms of an induction-to-bridge-for-deduction-to-hypothesis-for-induction spiral in research method (see Figure 1).

While Cattell (1988) showed the spiral across time, Stephen Toulmin provided a model that made it possible to look into the spiral from a cross section; his extended model with its backing permits us to look into the inductive phase that supports the warrant. Of course, my view on Toulmin was placed into question (Adams 2011 (a); Adams 2011 (b)). As a result I drew the Bridge Models of Reasoning (Adams, 2009; Adams. 2012; Adams, 2013). In my simple model, the bridge was defined as more abstract than both the premise and the conclusion to ensure that it clearly showed the general to specific nature of deduction (not to mention an accurate representation of reasoning). Some extension models were used to illustrate the inductive phrase; thus, without a doubt, providing a view into the spiral.

Figure 1

Induction to Bridge Statement for Deduction to Hypothesis Spiral



So, in typing reasoning, the beginning step is to classify two phases of the process. It is a chicken-and-egg type question: in discussing the spiral, one can start with either induction or deduction. However, to avoid more confusion, it would be good to be consistent in discussing the beginning of either process. It is best to see induction as beginning with a series of observations (as in driving habits) and ending with a generalization about their nature (as in texting reduces performance). It is best to see deduction as beginning with a generalization and applying it in one situation (even if that application is made in another state).

Much of our present difficulty in understanding reasoning can be traced to the general practice of debate coaches to insist that the process often begins with an observation presented as evidence (for example: Crocker, 1944; Klopf & McCroskey, 1969; Ziegelmuller and Dause,1975; Ehininger & Brockriede, 1978; Corbett & Eberly, 2000). They named arguments, primarily, by what was observed: sign, example, cause and analogy. While noting that evidence could be presented at any time, Ehninger and Brochriede (1978), stated, "In any given unit of proof, evidence functions as the starting point." This view for Ziegelmuller and Dause (1975) that reasoning started with data was so strong that they faulted the centuries-old definition of induction. They chose to change the definition in lieu of altering their position. They defined induction as "the synthetic process used in moving from particulars to probable conclusions" (p. 88). Thus, they masked the essential element of generalizing that is essential to induction. (To their credit, they did recognize the contradiction while others still have not and they correctly classified sign reasoning as a form of deduction.)

Types of Propositions

The second step in classifying reasoning was to type the propositions found in the bridges used in deduction. Copi (1982) and Ehninger's (1974) were in their separate ways good starting sources for this classification. While recognizing the shortcomings in Aristotle's definition, Copi allowed it to guide his classification of types of syllogisms. Still, from his discussion, it was easy to identify five different types of proposition. In his terms they were (1) categorical, (2) disjunctive, (3) analogical, (4) hypothetical, and (5) causal. His classification of arguments yielded more than five types because one type of proposition can be used as the major premise and another for the minor premise. The system presented below uses only the major premise/bridge statement as the basis for classification. This limitation gave a more streamlined and, thus, practical system.

In expanding on Toulmin, Ehninger (1974) also arrived at the key number five. He explained five methods of relating data to the claim instead of five types of warrants. His use of methods, unfortunately, lost the needed focus on types of propositions. His desire to cast the five in terms of methods as opposed to types of warrants seems likely due to his view that reasoning started with an observation. Still, Ehninger's methods correspond fairly closely with Copi's types of syllogisms in terms of the first three, but he had one type for the final two. For *categorical,* Ehninger used *classification*; for *disjunctive*, he used *division*; and for *analogical*, he used *comparison*. For hypothetical and causal, he used *connection*, dividing it into cause and sign. For his fifth method, Ehninger's included *generalization* which, of course, corresponded to induction, not the syllogisms of deduction.

Despite their different frameworks, both Copi (1982) and Ehninger (1974) provided the basis for concluding that there are five types of propositions for use in classifying bridge statements that are used to link a specific observation (premise) to reach a conclusion. This classification of reasons/arguments based on the relationship expressed in these bridge statements is as follows:

Classification: members of a class tend to have the same characteristics (X_i has c). The name, classification, is preferred to categorical because of the latter's

absolute implications. The word, genus, could be selected, but it is more obscure. Generalization has also been used clearly to reference this type of relations, but more often and more correctly, the word denotes the induction process.

Division: only a limited number of options exist (x can only be a, b, c or d). Disjunctive could equally be used; actually, it reflects better a relationship. However, it seems more obtuse. The word, elimination, was rejected because of its focus on method.

Similarity: two events/acts/entities share some characteristics (x and y are alike). Similarity was selected over both analogical (or analogy) and comparison because it captured the quality of a relationship. The same can be said in its contrast with parallel case which emphases the method of comparison.

Contingency: if one action/event occurs another action/event is likely to occur (x then y or y then x). The word, co-occurrence, also speaks clearly to this relations and I tend to use it often. The problem with sign is that the focus is on the observation, only one part of the relationship. For the observation to have meaning, the observer must be cognizant of its significance in the relationship.

Cause: an action/event leads eventual to a result (y if and only if x). Causal works as well. Of course, given the strength of this believed relationship, reasoning that uses it may move both from cause to effect and from effect to cause.

Current Speech-Communication Texts

With the above understanding of the nature of reasoning, I examined 17 current speech-communication texts to determine if they included a discussion of argumentation/reasoning and if so, to what extent their discussions reflected that understanding. The 17 texts were the population from the two major textbook publishers in the field because they were the ones judged most likely to be used in the majority of our courses. The discussion of the texts is grouped by nature of the text's content.

Public Speaking

Five of six of the mainstream public-speaking texts devoted space to typing arguments/reasoning. These texts were similar in that they mixed induction and deduction with other types of reasoning. None saw a relationship between the type of reasoning and the proposition from which the reasoning pursued. Instead, as with Gorman et al. (2010), their types better reflected "patterns." Again this tendency was consistent with earlier writers who saw reasoning as beginning with the observation. In this way, the labels for the types of reasoning centered on the observations involved: sign, analogy, cause, and example. Only in the deduction was the pattern started with the principle.

Each of the five texts made it clear that the pattern for the cause/causal argument could move from either the cause or the effect. Of course, starting with either the cause or the effect to convince an audience of the other predisposes that the causal relationship between the two is already in the minds of the audience; then the reasoning is deductive. However, if the idea that a cause does produce the effect isn't already accepted, the speaker may use an authoritative source to get the audience to accept the relationship; or, the speaker may establish the relationship

through a series of examples where the cause did produce the claimed effect. This latter use of examples to gain acceptance of the causal relationship is induction.

All five of the texts that discussed types of arguments included examples/specific instances as a type. All of them recognized that by providing a series of examples or instances, the speaker expects the audience to generalize the relationship. Devito (2012) went so far as to label the type, "specific instances and generalizations" (p. 236). They all recognized that the type was also termed *induction* although German et al. (2010) combined the word, *generalization* with deduction in their discussion. Beebe and Beebe (2012) confused the issue somewhat with the statement, "Using this classical approach [induction], you reach a general conclusion based on specific examples, facts, statistics and opinions" (p.341). Of course, the last four items in their list are used in deduction.

The examples provided of induction all resulted in a classification proposition. Only Beebe and Beebe (2012) provided any indication that induction may also be used to generate the propositions used in any other pattern. They identified analogy as a special type of induction. They supposed that texting laws reducing injuries in two states might be used to justify (by analogy) the passing of the same law in a third state. Given that the audience accepted the two states as a sufficient number of instances, the audience might conclude a causal link between the law and the reduction in injuries. If the audience members did accept this causal relationship, they would be more willing to support the legislation in the third state. The Beebe's example, then, did not fit their definition: "When you observe that two things have a number of characteristics in common and that a certain fact about one is likely to be true in the other, you have drawn an analogy" (p. 343). The first part of their definition (two things have commonalities) provides the conditions for inducting a similarity bridge (or analogy). The second part (a fact true about one is likely to be true of the other) is the deduction part. To illustrate analogy as a case of induction, the Beebes needed to show specific (and relevant) similarities between two states. Then the fact that the law reduced accidents in the first state could have been a reason (through analogy) to pass the law in the second state. Of course, a speaker can simply assert the similarity (or leave it implied) if it is reasonable that audience members will already accept that the two states are similar.

Lucas (2012) supplied a good example of an analogy used as a deductive argument: "if you're good at tennis, you will probably be good at ping pong" (p.337). The listener would likely supply the similarity bridge that ping pong is much like tennis. German et al. (2010) discussed the similarity type reasoning under parallel case. Both these texts supplied a definition of this type of reasoning which would include both the inductive and deductive phases. Devito (2012) did not include reasoning from analogy in his list.

Only Devito (2012) and German et al. (2010) included sign reasoning in their patterns. This was somewhat surprising since contingency reasoning is so common and usually the most reasonable type of reasoning. It is the reasoning of the medical profession, as noted by Devito, and the detective. Moreover, none of the texts included the elimination pattern (division type) of reasoning.

Engleberg and Daly (2013) was the exception in defining types of argument/reasoning. Instead, they discussed the Toulmin model. They defined the

terms of Toulmin appropriately. However, their example argument was somewhat polluted. In essence they had two data for their claim. The data given was, "Most people lose weight while keeping dairies," and their warrant was, "A study shows … diaries are twice as effective as other methods." Their claim was, "Keeping a diary is the best method to … lose weight" (p. 45). Either their data or their warrant could have been the factual basis for their claim; but, each would require an appropriately linking warrant. Then, of course, "A study shows," was backing for the statement that followed.

Introduction to Communication

Six texts fell into this category. Engleberg and Wynn (2011) provided an excellent discussion of Toulmin with a solid example of his model as their discussion of reasoning. Pearson and Nelson (2000) and Pearson et al. (2011) restricted their discussion to distinguishing well the differences in the two processes of reasoning, induction and deduction.

Of the three books that discussed reasoning according to methods or patterns, Beebe et al. (2010) paralleled the discussion in Beebe and Beebe (2012) sufficiently so as to make a discussion here unnecessary. The same can be said of Devito (2011) with his public-speaking text.

Gamble and Gamble (2010) presented four types of reasoning: deductive, inductive, analogy and causal. For deduction, their example on fad diets was clear and it placed the motivation as premise in keeping with the analysis of Adams and Cox (2008). They also were clear for causal and analogy; in the latter, they showed how the similarity of two cities had to be established before concluding that welfare reform that worked in the first city might reasonably work in the second city. In contrast, for induction, the focus was clearly on organizational patterns, not reasoning. Their definition of induction missed the significance of drawing an inference from examples to form a principle reflecting similar instances; they had the examples "compose a principle about parts of the whole" (p. 429) in their definition.

Interpersonal

Two of the interpersonal-communication texts. Beebe, Beebe and Redmond (2011) and Floyd (2011), did not include a discussion of reasoning. Devito (2009) placed a focus on fallacies and propaganda in his chapter on listening.

Small Group

The only text in this section was Beebe and Masterson (2012). They discussed three types of reasoning, induction, deduction and causal. While this reflected a collapsing of Beebe and Beebe's (2012) four types, the treatment was essentially the same.

Argumentation and Debate

As could be expected, the two texts in this group reflected the most complete analysis of reasoning. Both discussed Toulmin with helpful examples. While Toulmin's model avoided Aristotle's restriction on deduction, both texts, in their discussions of types of arguments/syllogisms, retained an Aristotelian element.

Rybacki and Rybacki (2008) explained five types of arguments: sign, cause generalization, parallel case, and authority. For the most part, then, they retained a view of reasoning as a pattern. Sign, cause, generalization and parallel case would all start with observations. Hopefully, generalization, as induction, would start with a series of observations; of course, the observation could be any of the other three: sign, cause or analogy. Then, authority comes from an entirely different list: substantial, authoritative and motivation. This latter list has as its basis the substance of the proposition instead of the relationship captured in the proposition.

Inch and Warnick (2010) centered their discussion on syllogisms and were much like Copi (1982) in that they included a consideration of all five types of propositions, including the disjunctive syllogism which corresponds to division. Overall, their treatment of argument was the most in agreement with the position taken here on reasoning.

Conclusion

This paper discussed the terminology used in defining argumentation/reasoning to provide a position from which future explication could develop a more consistent analysis than presently found in the literature. The paper identified two factors which have contributed to the tangled explanations of reasoning. It also presented two steps in the reason process and five types of propositions to be used in classifying the major premise/warrant/bridge in arguments.

Based on the position outlined, the paper examined the mainline texts used in speech communication in terms of their discussion of argumentation. While some consistency was noted, there was no established treatment of argument among them. All but one text omitted more than one type of proposition in their discussions. The general rule was that the texts saw argumentation starting with an observation and used the nature of that observation in their typing.

Inconsistent usage of argumentation/reasoning terms was present in the current texts and inconsistent usage has been a confusing factor over the 60 years that I've been studying reasoning. Three terms have been sufficiently problematic to justify special focus. First, the word, *generalization*, has been used correctly to stand for the induction process and more confusingly as a proposition (classification) that says a group has the same characteristics. Second, *analogy* has prompted confusion because typically, as used, it truncates both induction and deduction in its application. Whenever a speaker supports a proposition with examples while applying the proposition, particularly implicitly, to help the listener reach the intended conclusion, coders have problems. This is true whether the proposition is cause, classification or contingency; however, this situation had been most puzzling for the profession when the proposition is of the similarity type. Finally, there is the problem with *sign*. Most authors have classified sign reasoning as a form of induction while providing examples that fit exactly the non-Aristotelian meaning of deduction. Clearly, when a person uses a sign to reach a conclusion, that person has already started the process with the acceptance of a principle that bridged the sign to the conclusion. Indeed, an observation only gains any significance if the observer already understands its importance. That's why Sherlock Holmes was so good at deduction: he had sufficient knowledge to recognize the importance of clues when he

saw them. An observation is only useful to a person who is already reasoning with knowledge of the general principle, i.e., deducting.

Overall, any frame of reference that stresses the importance of evidence as the start of a pattern in the argumentation process has already laid the groundwork for misclassification.

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