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Common pedagogical weaknesses in critical thinking textbooks and courses

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Title: Common pedagogical weaknesses in critical thinking textbooks and courses
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I

Overlooked Evaluative Skills in the Interpretation of Reasoning in Critical Thinking Courses and Textbooks

I will describe some recurring pedagogical weaknesses in critical thinking textbooks and courses. First, we typically overlook that the effective and efficient interpretation of most arguments requires the correct application of evaluative skills, and as a result we usually teach evaluative skills later than we should. Secondly, one of the most common serious pedagogical mistakes consists of teaching skills, standards, and concepts in a way that contributes to students' fragmented learning. I will suggest ways of addressing these difficulties and others.

Most textbooks and courses present material in two stages. First there is the *interpretation* or *analysis* of an argument (or explanation), where one teaches how to do a number of important tasks: (1) use the principle of charity; (2) distinguish arguments from non-arguments (or explanations from non-explanations); (3) identify the reasons and conclusions; (4) identify expressions that need to be clarified, and then clarify them; (5) map out in a diagram the interconnections among premises and conclusions in one's reasoning. Secondly, there is the *evaluation* of an argument (or causal explanation), where one teaches the skills necessary to evaluate the truth and support (or strength of the causal connection) of the reasons represented by the diagram. Though most philosophers recognize that evaluative skills are involved in many interpretations, most critical thinking instructors and textbook writers have overlooked pedagogically that the application of some evaluative skills is necessary for the effective and efficient execution of the interpretive stage, in particular, the construction of counterexamples against the support of premises (i.e., the description of possible or imaginable situations where all the premises are true and the conclusion false). Because of this oversight, there is a common unfortunate consequence: we are generally not as pedagogically effective as we could be in teaching critical thinking courses, or in writing textbooks for such courses. I will describe the various tasks involved in the interpretation of reasoning, and show how their successful execution requires evaluative skills.

I will also argue that our typical way of organizing and teaching our material contributes to fragmented learning in students: they might develop some mastery of many specific skills, but they do not know how to orchestrate them when applying them to real-life situations.

Principle of Charity

The interpretive stage of argument evaluation is guided by the principle of charity. According to this principle, if there are different ways of interpreting a statement, we choose the interpretation that yields the most *reasonable* result. For example, if someone asserts, "He's a chicken", this is a flagrantly false statement if we interpret it literally, but it can make sense if we

interpret it figuratively as meaning "He's a coward" or "He's afraid". And if there are different ways of interpreting an argument or explanation, we choose the interpretation that results in the strongest argument or causal explanation. According to the principle of charity, we should assume that others are presenting reasonable arguments unless we have evidence to the contrary.

Here are some different ways in which the principle has been expressed "interpret a passage so that it makes most sense" (Leblanc, 1998:14); "try to be as fair as you can. Give the position the best chance to succeed. After all, you would not want to reject a conclusion that is correct" (Ennis, 1996: 170); "where the text is indeterminate, you should interpret the argument in the way that makes it most likely to be cogent … interpret statements and arguments in the way that makes them most defensible" (Hitchcock, 1983: 10-8).

The successful application of this interpretive principle requires that one be already able to *evaluate* the truth of premises *and* their support for a conclusion (for example, by means of counterexamples against the truth or support of the premises). Without such skills one will not be able to determine effectively and efficiently which one of competing interpretations results in the most probable premises and the strongest support. Yet the textbooks that do discuss the principle of charity typically present it before they describe how to evaluate an argument (e.g., Bickenbach, Davies, 1997; Cederblom, Paulsen, 2001; Cogan, 1998; Dowden, 1993; Groarke, Tindale, Fisher, 1996; Hughes, 1997; Johnson and Blair, 1983; Leblanc, 1998; S.P. Schwartz 1994; Thomas, 1997; D. Wilson, 1999; Wright, 1989), or introduce it without having giving much in terms of assessing the truth or support of premises (e.g., Kelley, 1998; Kelly, 2001).

The principle of charity is a reminder not to misrepresent someone's argument or explanation. Misrepresentation occurs when we criticize something that does *not* correspond exactly to what an author or speaker has stated or implied. In order to identify what is truly implied by a passage or a speech, one must be able to evaluate one's basis for claiming that an author's given statement implies a statement that we find questionable. Yet the assessment of implication usually occurs much later once the principle of charity has been described. In addition, the principle reminds us to paraphrase an author's statements only with logically equivalent ones, that is, with statements that mutually imply each other. Yet, students are typically taught how to determine whether statements are equivalent (or mutually entail each other) *after* they have been introduced to the principle of charity.

In summary, the principle of charity, the guiding principle of interpretation, requires the correct application of some evaluative skills that are often presented later in courses or textbooks.

Identify the 0.function of statements: premise(s) or conclusion

Before we can assess an argument or a causal explanation, we must be able to determine which statements are used as reasons and which are used as conclusions. Sometimes their function is easily identified when the passage uses premise indicators (e.g. "since", "because", "as") or conclusion indicators (e.g. "so", "therefore", "hence", "consequently"). However, sometimes those inference indicators are not utilized, and in such cases the *"therefore" test* is used to identify the function of statements (e.g., Cogan, 1998: 13-14). Here is a standard way in which this technique is communicated: "you take each proposition you are considering as a possible conclusion (one at a time), move it to the end of the passage, insert the word "therefore"

in front of the proposition, and see *which result makes the most sense*" (my italics, Ennis, 1996:23-24; see also Cogan, 1998: 13-14). Here is an example from Ennis. First we have an argument:

> (1) (a) The streets are very slippery. (b) Lynn should not ride her bike.
>
> The next two cases illustrate the application of the "therefore" test to the preceding example:
>
> (2) (b) Lynn should not ride her bike. *Therefore*, (a) the streets are very slippery.
>
> (3) (a) The streets are very slippery. *Therefore*, (b) Lynn should not ride her bike.

Since interpretation (3) "makes more sense", this is probably the intended reasoning of the author.

There are variations on this technique. For instance, instead of mentally manipulating (1) into (2) and (3), one could mentally insert both a premise and a conclusion indicator into (1): The streets are slippery. [*because/therefore*] Lynn should not ride her bike. The reading "makes more sense" when we use "therefore" rather than "because", and so, the statement (a) is a reason for statement (b).

In order to arrive at the interpretation that "makes most sense", one must do three things: evaluate the support of (a) for (b); evaluate the support of (b) for (a); contrast the support in each case; and identify the interpretation that results in the strongest support. However, textbooks typically teach how to assess support much later. Hence, students must rely on their vague and rough intuitions regarding the assessment of support to identify which interpretation "makes sense", and they experience frustration when they must evaluate arguments that are more complex than the ones used to illustrate the application of the "therefore" test.

The *effective* application of the "therefore" test shows that at the very first stage of interpreting someone's reasoning, where we must determine which statements function as premises or conclusions, we must use evaluative skills to assess the support of different premises. Yet we typically teach the "therefore" technique without teaching our students some fundamentals of assessing the support of premises, such as inventing counterexamples against an inference, and attending to the meaning of key words in the premises or conclusions that affect the construction of such counterexamples. (Barry, 1983; Beardsley, 1975; Bierman, Assali, 1996; Browne, Keeley, 1990; Cederblom, Paulen, 2001; Cogan, 1998; Copi, 1986; Copi, Burgess-Jackson, 1992; Ennis, 1996; Diestler, 1994; Ehninger 1974; Gutteridge, 1995; Hinderer, 1992; Hoaglund, 1995; MacKinnon, 1985; McKay, 2000; Malone, Sherry, 1998; Missimer, 1990; K.D. Moore, 1993; Munson, Conway, 2000; Nolt, 1984; Romain, 1997; Rudinow, Barry, 1994; Russow, Curd, 1989; Stratton, 1999; Thomas, 1997, Thomson, 1996; Weddle, 1978; Warwick, Inch, 1994; B.A. Wilson, 1986; D. Wilson, 1999; Wright, 1989; Zieglemueller, Kay, 1997).

Distinguish arguments from non-arguments

One of the first interpretive skills taught to students is that of distinguishing arguments from non-arguments (or explanations from non-explanations). But evaluative skills are required at this early interpretive stage when it is not clear whether a passage is an argument or non-argument. For we must evaluate the passage *as if* were an argument. If the support of the its premises is weak, and if there is no clear indication that the author or speaker intended the passage to be an

argument, for example, by using premise or conclusion indicators, then we should interpret it as a non-argument. For according to the principle of charity, we should assume that authors or speakers are reasonable, and that they would not advance weak arguments. However, the greater the support of their premises is above moderate strength, the more charitable it becomes to interpret the passage as an argument. Though the interpretation of such passages requires that one be able to evaluate the degree of support of premises (e.g. by estimating the probability of all the most probable situations where the premises are true and the conclusion false, that is, estimating the combined probability of the most probably counterexamples), such evaluative skills are often presented later in courses and textbooks (Barker, 1981; Bickerbach, Davies, 1997; Freeman, 1993; Govier, 1997; Groarke, Tindale, Fisher, 1996; Hinderer, 1992; Hoaglund, 1995; Hurley, 1991; Kelly, 2001; Leblanc, 1998; Malone, Sherry, 1998; K.D. Moore, 1993; Munson, Conway, 2000; Nolt, 1984; Reichenbach, 2001; Salmon, 1995; Seech 1993; Shaw, 1997; S.P. Schwartz, 1994; Scharwaze, Lappe, 1997; Thomas, 1997; B.A. Wilson, 1986; D. Wilson, 1999; Yanal, 1988).

Since arguments and causal explanations are distinct, the interpretive stage requires that students distinguish them. I will first describe some of their important similarities, which will partly explain why it is sometimes difficult to distinguish arguments from explanations; secondly, identify some of their important differences; and thirdly show that the ability to distinguish arguments from explanations requires the application of certain evaluative skills.

I will use the following two examples to describes their similarities and differences:

Argument: (1) The students were energetic during the whole class because they posed many good questions throughout the class.

Causal explanation: (2) The students were energetic during the whole class because they had a very nutritious breakfast.

They are similar in the following respects: (a) They are both constructed from reasons and a conclusion, though it is awkward to call the effect or result that is cause a conclusion.(b) We sometimes use identical reason (e.g. “because) or conclusion indicators to identify the function of statements. (c) We use the same standards of reasoning (clarity, precision, accuracy, relevance, impartiality, logic, completeness of information, depth, and breadth) to evaluate them.

I will illustrate one way in which they are similarly evaluated with respect to the criterion of logic. Here is a counterexample by possible conjunction against the argument: *It is possible* that the students posed many good questions throughout the class [all the premises are granted]; *and* they are very interested in the subject matter; *and* they worked the whole night to prepare all those questions; *and* the students were not energetic [the conclusion is negated.]. Here is a similar counterexample by possible conjunction against the explanation: *It is possible that* the students had a very nutritious breakfast [all the reasons are granted]; *and* they worked the whole night to prepare all those questions; *and* the students were not energetic [the conclusion is negated.] The counterexample against the argument shows that its reason is not sufficient *for the truth* of the conclusion, while the counterexample against the causal explanation shows that the *cause* (causal factors) expressed in its reason is not sufficient *for the event* (i.e. being energetic) *expressed in the conclusion*. The method of using this kind of counterexample applies to both arguments and causal explanations.

Despite the above similarities, arguments and causal explanations are fundamentally different.

(a) They have different goals: with an argument one attempts to *support the truth* of its conclusion, but with a causal explanation one *assumes that the conclusion is true*, but attempts to *understand why it is true*.

(b) As a result of these different goals, the kinds of reasons that support the truth of the conclusion of an argument are *typically* different from the kinds of reasons that make us understand why a conclusion is true. The examples in the preceding paragraph illustrate this: the kind of reason that supports the truth of the claim that the students were energetic during the whole class is very different from the kind of reason that helps to understand why it is true that students were energetic during the whole class. I cannot say that the reasons of arguments and explanations are always different because there are some cases, in the proper context, in which a reason either explains or supports the truth of a conclusion, for example, "My students are all alive because they are breathing".

(c) There are respects in which arguments and causal explanations are evaluated differently. When one presents relevant but insufficient reasons to support a conclusion, and someone else presents an alternative relevant but also insufficient reason for the same conclusion, this does not weaken the initial argument. In fact, the premises work together to increase the probability of the conclusion. For example, the argument that the students were energetic during the whole class because they were posing many good questions throughout the class is not weakened by proposing an alternative reason such as, they were also very attentive throughout the class. This additional relevant reason works with the given one to make it more reasonable to believe that the conclusion is true. However, when one presents reasons in order to causally explain something, and someone else advances an alternative explanatory (as opposed to supportive) reason, this does weaken or raise doubts about the first explanation. For instance, the explanation that the students were energetic during the whole class because they had a very nutritious breakfast is weakened by proposing an alternative cause such as, they had a good night of sleep. Instructors and textbooks typically fail to point out that when we advance alternative relevant but insufficient reasons for the conclusion of an argument, those reasons *collaborate* to increase the probability of the conclusion, and do not weaken the initial argument, but when we advance alternative relevant reasons for the conclusion of a causal explanation, those reasons *compete* to explain what is stated in the conclusion, and do in fact weaken or raise doubts about that initial explanation.

How does all this show that evaluative skills are necessary in the interpretive stage? With the above similarities and differences in mind, I will next show that one must be able to *evaluate* arguments and causal explanations *in order to* distinguish them. Let us assume that we do not know how to identify the following reasoning: the students were energetic during the whole class because they posed many good questions throughout the class. (a) We focus *exclusively* on the conclusion and ask ourselves, "What kinds of reason would *support* the truth of the conclusion?" To answer such a question, one must be able to determine whether a reason is relevant, and so one must be able to *evaluate* the degree of support of the entertained reasons. (b) We write down or mentally note a few examples: they were active in the small and large group discussions; they posed many good questions; everyone's concentration peaked throughout the class. (c) We again focus *exclusively* on the conclusion, but we now *assume that the conclusion is true*, and raise the

question, "What kind of reason would help us to *understand why* the conclusion is true?" To answer such a question, one must be able to determine whether a causal factor is relevant, and so one must be able to evaluate the degree of adequacy of the entertained causal factor. (d) We write down or mentally note a few examples: they slept well the night before; they were very interested in the subject matter; they all took amino acids that stimulate neurotransmitters. (e) We then compare the two lists of examples to the *given* reason. (f) If the *given* reason resemble more the reasons that support the truth of the conclusion, then the passage is probably an argument; but if it resembles more the reasons that help us to understand why the conclusion is true, then the passage is probably an explanation.

Here is another approach to determine whether someone's reasoning is an argument or an explanation, and its successful execution also requires that one be able to evaluate arguments and explanations. Assume that we are given the following reasoning: the students were energetic during the whole class because they posed many good questions throughout the class. Let us also assume that we do not know whether it is an argument or a causal explanation. There are three general steps to determine with some degree of likelihood what the reasoning is: (a) evaluate the reasoning *as if* it were an argument. (b) Evaluate the reasoning *as if* it were a causal explanation. (c) Contrast the result. (d) Apply the principle of charity such that if the reasoning is a strong argument but a weak explanation, then we interpret it as an argument. However, if it is a strong explanation but a weak argument, then we interpret the reasoning as an explanation. (The fact that there are cases where alternative interpretations result in equally strong arguments and explanations does not discredit this procedure: it only shows that sometimes we have no grounds for preferring one interpretation over another.) Yet early on in our courses or in textbooks where student must determine whether passages are arguments or explanations we typical fail to give them the tools to evaluate arguments and explanations.

These are the only two systematic approaches that I know of to distinguish arguments from causal explanations, and they both require skills to evaluate arguments and explanations. Yet the evaluative tools required to apply these approaches are typically presented after students have been asked to distinguish arguments from explanations. And they are typically instructed to do so simply by focusing on contextual or linguistic cues that suggest that a conclusion is either assumed to be true, or argued for. The common frustration of our students shows the limitations of the latter approach.

Clarifying key words

The interpretive stage often includes the clarification of certain words in reasons or conclusions. Many textbooks authors assume that by just elaborating on the criteria of good definitions, expounding on vagueness and ambiguity, students will know *which words require to be clarified*. Since not all vague or ambiguous words in arguments and explanations need to be clarified, I will show that one must be able to evaluate the sufficiency of reasons (for either the support of the truth of a conclusion in an argument, or the causal adequacy of reasons in an explanation) in order to identify *only* the words that need to be clarified.

Consider the following argument:

> All the physical sciences (the neurosciences, artificial intelligence, genetics, psychology, physics, chemistry, etc.) individually and jointly fail to explain consciousness. Therefore consciousness is not a physical phenomenon.

Despite the fact that "consciousness" means so many different things to different people, it is not necessary to clarify it in order to show that the argument is invalid. For, as I will illustrate very shortly, the support of the reason can be evaluated regardless of the meaning of "consciousness". Consider the following simple counterexample by possible conjunction against the inference: *It is possible that:* all the physical sciences (the neurosciences, artificial intelligence, genetics, psychology, physics, chemistry, etc.) individually and jointly fail to explain consciousness; *and* these physical sciences will explain it in a remote future; *and* consciousness *is* a physical event. This counterexample shows that it is possible for the given reason to be true and the conclusion false, and thus that the given reason is not sufficient for the truth conclusion – *even if* the typically problematic word, "consciousness", is not clarified.

We can also use a counterexample by analogy to show that "consciousness" does not need to be clarified, no matter how vague or imprecise it may be. The general form of the argument is:

> All the physical sciences individually and jointly fail to explain X (whatever "X" may be).
>
> Therefore, X is not a physical phenomenon.

Here is a counterexample by analogy in which I replace "X" by anything that will result in a true reason and a false conclusion. Assume that the argument is presented in the Middle Ages:

> All the physical sciences (in the Middle Ages) individually and jointly fail to explain the plague.

Therefore, the plague is not a physical phenomenon.

The counterexample has the same form as the argument against which it is advanced, which is why it is named a counterexample by analogy, and it has a true premise and a false conclusion; thus, *any* argument that has only that form (or has only other invalid forms) is invalid, so the argument about consciousness is invalid.

The preceding example proves that *not all* ambiguous or vague words in a premises need to be clarified in order to assess the support of the premises. Only the expressions whose ambiguity or vagueness significantly affects the truth or support of the reasons need to be clarified. Students must learn to clarify only the *relevant* expressions. But this is possible only if students know how to assess the truth or support of reasons. Yet we instructors of critical thinking courses and textbook authors usually discuss issues of meaning and clarification *before* teaching anything about the evaluation of the truth and support of reasons. (Barker, 1981; Bickenbach, Davies, 1997; Browne, Keeley, 1990; Carey, 2000; Chaffee, 1997; Copi, 1986; Copi, Burgess-Jackson, 1992; Ehninger 1974; Epstein, 1999; Freeman, 1993; Fogelin, 1997; Groarke, Tindale, Fisher, 1996; Gutteridge, 1995; Hughes, 1997; Kelley, 1998; Kim, 1994; Little, 1980; Moore, Parker, 2001; Munson; 1976; Purtil, 1989; Reichenbach, 2001; Rudinow, Barry, 1994; Runkle, 1991; Salmon, 1995; Seech, 1993; Schwarze, Lape, 1997; Sproule, 1980; Stratton, 1999; De Witt Spurgin, 1994; Yanal, 1988; D. Wilson, 1999; Warwick, Inch, 1994).

Diagrams of the reasoning

The skill of diagramming reasoning is part of the interpretation, and it is usually taught before evaluative skills. The purpose of diagrams is to map out the general structure of one's reasoning, in order to see clearly how reasons and conclusions interrelate. When we know clearly the structure of an argument or an explanation, we can organize our evaluation more effectively and efficiently. I have also found that getting students to literally see clearly the structure of their *own* reasoning by having them diagram it has helped them to evaluate themselves more effectively. I will first describe the main patterns of these diagrams, and then show how diagramming arguments requires the use of evaluative tools.

Premises can be linked (or dependent) in supporting a conclusion: (A) (1) If someone is a philosopher, then s/he is neurotic, (2) I'm a philosopher, so, (3) I'm neurotic. This argument would be diagramed as (assume that the bars represent arrows pointing downward),

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Reasons can be independent: (B) (1) You should not drive over the speed limit because (2) it's against the law, and (3) you should not break the law. Moreover, (4) you endanger people's lives, and (5) you should not do that.

2 + 3 4 + 5

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In this kind of argument reasons converge toward the same conclusion. That is why it is sometimes named "convergent argument". This reasoning can also be represented by an equivalent diagram:

2 + 3 4 + 5

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In the next structure, one or more reasons support different conclusions. (C) (1) You could be a target for mail theft. So, (2) always keep incoming mail in a locked mailbox. (3) Pick up incoming mail promptly after delivery. (4) Never leave mail in your mailbox overnight.

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This reasoning can also be represented by an equivalent diagram:

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Reasoning can sometimes flow in a series: (D) (1) It's has been raining very hard for a few hours, so (2) the soccer field will be too wet to play, consequently, (3) the soccer game will be cancelled.

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In this fourth example statement (2) plays two roles: it functions as a conclusion with respect to premise (1), and as a premise with respect to statement (3). These basic kinds of diagrams can be used to illustrate complex argumentation that extend in the form of a tree: many linked and independent premises provide successive support, and converge toward a final conclusion, just as all the branches of a tree ultimately interconnect toward its trunk. We can use the interpretive tool of diagramming argument to represent complex reasoning to help us orient our evaluation.

Now we understand the interpretive function of these diagrams, I will show that their construction often requires the use of evaluative skills. First, since diagrams are just a visual way or representing the use of statements as either premises or conclusions, and I have shown that we must use evaluative skills to determine the use of statements when there are no premise or conclusion indicators, we must use the same evaluative tools to diagram arguments when they do not use indicator words.

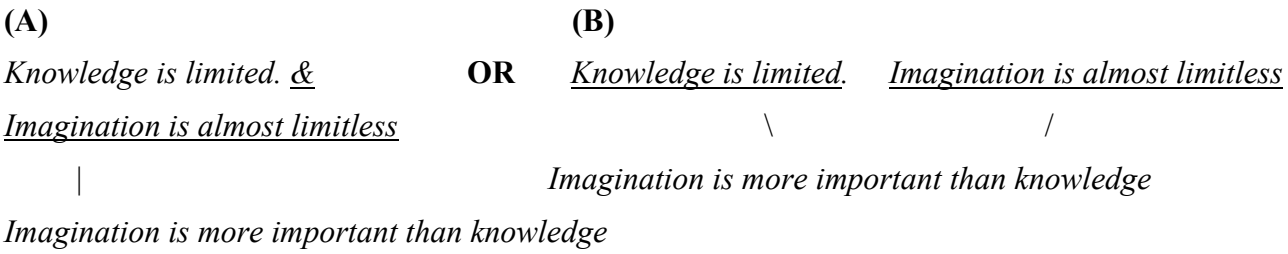
Secondly, I will demonstrate that correct application of evaluative skills are necessary in order to determine whether reasons are dependent (linked) (illustrated by example (A)) or independent (illustrated in example (B)). To my knowledge, all textbook authors overlook that there are at least three different approaches to determine whether reasons are dependent or independent. I will describe each one, and then show how the successful execution of each approach requires the application of evaluative skills.

Conceptual Dependence

1) Identify all the central concepts in the conclusion.
2) Look for all these concepts in each reason.
3) If these central concepts are in different reasons, then these reasons are dependent (linked). In other words, if a reason has only one of those concepts, it must be linked to other (explicit or implicit) reason(s) that has (have) the other central concepts. We continue linking reasons until all the central concepts are among the reasons.
4) If a statement does not contain any of the central concepts, it could be irrelevant.
5) If all the grouped *explicit* premises still lack a central concept used in the conclusion, then there is an unstated (unexpressed, missing, implicit, hidden, tacit, suppressed) premise that contains that central concept.

Evaluative skills are necessary to execute step (4). For in order to determine that a statement is irrelevant, and thus does not function as a premise, one must see that if that statement were true, it would not increase the likelihood of the truth (or falsity) of the conclusion. But such skills are usually taught after the skill of diagramming has been taught.

The ability to evaluate the adequacy of supportive or explanatory reasons is also necessary in order to *understand* step (3), to understand why premises containing different central concepts in a conclusion must be linked. I will illustrate this with an argument adapted from Einstein: Knowledge is limited and imagination is almost limitless. So, imagination is more important than knowledge. The following diagrams illustrate the different options we have to *interpret* the argument (let the bars stand for arrows pointing downwards).



If the premises were independent, as illustrated in the above diagram (B), there would result two arguments whose premises would provide *in*sufficient support, for one could easily imagine the premises true and the conclusion false. What facilitates the construction of such counterexamples is that the conclusion is about *both* imagination and knowledge, but each premise is only about imagination, or only about knowledge. If the premises were dependent (linked), as illustrated in the above diagram (A), the result would be stronger support for the conclusion.[1] Then according to the principle of charity we should opt for this interpretation. This example illustrates that the task of assessing and contrasting the support of independent and linked premises is sometimes required even at the earliest interpretative stages where we are trying to visually represent the structure of an argument. Thus, evaluative skills are necessary even at the early interpretive stage.

The correct execution of the next approach to determine whether reasons are dependent or independent also clearly depends on one's ability to evaluate the support of reasons.

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[1] It would be stronger because some of the counterexamples against the two arguments in (B) would not apply to (A). For example, here is one counterexample against the left argument in (B). *It is possible that*: knowledge is limited [all the premises are granted]; *and* there is hardly any imagination in the world; *and* it is not the case that imagination is more important than knowledge [the conclusion is negated]. Here is a counterexample by possible conjunction against the right argument in (B). *It is possible that:* imagination almost limitless [all the premises are granted]; *and* knowledge is limitless; *and* it is not the case that imagination is more important than knowledge [the conclusion is negated]. The conjunction of both premises in diagram (A) would block these two counterexamples because such counterexamples must grant all the given premises of an argument in order to evaluate the sufficiency of those premises.

Supportive Dependence

1) Identify the conclusion.
2) How strongly stated is the conclusion?
3) The more strongly stated the conclusion, the more support it requires.
4) Use counterexamples to test whether *each* premise or group of premises *by itself* is sufficient for the intended degree of support for the conclusion. If a premise or group of premises is not sufficient for the intended degree of support, then it will work with (it will depend on) another (explicit or implicit) premise or group of premises to support the conclusion to its intended degree.
5) If a premise or a group of premises (e.g. example (B)) is sufficient for the intended degree of support for the conclusion (i.e. if there are no counterexamples or no (very) likely counterexamples against the premise or the group of premises), then that premise or group of premises is independent of all other premises.

Consider the following argument to illustrate this approach:

> There are many reasons why we should improve our critical thinking abilities. We increase our chances of voting for the best candidate, making better investments, developing more appropriate friendships, pursuing more satisfying careers.

If we interpret the conclusion as being "There are many reasons why we should improve our critical thinking abilities", it is strongly stated because it speaks of "many reasons", and so no reason by itself would be sufficient to support the conclusion. In fact, because of the "many" in the conclusion, many reasons must be linked.

Even if the conclusion were simply, "we should improve our critical thinking abilities", then, according to the second approach describing the supportive dependence, the premises would still be linked. For counterexamples can be constructed against any single reason advanced in support of the conclusion. As we link more premises, more counterexamples are blocked, and so the strength of the support increases. Therefore, the premises are linked.

The next approach to determine whether reasons are dependent or independent consists of looking for standard logical forms of arguments. The procedure can be simply stated as follows:

Logical Dependence

1) Identify the conclusion and premises.
2) If two or more premises and the conclusion correspond to a particular form of an argument (e.g. (1) If A, then B. (2) A. So, (3) B.), then those premises are logically dependent (linked).

The ability to evaluate logical forms, to assess the support or relevance of premises is generally taught *after* students have been taught to diagram arguments and explanations.

Many textbook authors introduce the interpretive tool of diagrams before giving students any of the evaluative tools mentioned in this section (Beardsley, 1975; Bierman, Assali, 1996; Cederblom, Paulsen, 2001; Cogan, 1998; Copi, 1986; Copi, Burgess-Jackson, 1992; Ennis, 1996; Freeman, 1993; Govier 1997; Gutteridge, 1995; Herrick, 1991; Hoaglund, 1995; Hurley, 1991; Kelley, 1998; MacKinnon, 1985; McKay, 2000; Nolt, 1984; Russow, Curd, 1989; S.P. Schwartz, 1994; Thomas, 1997; Thomson, 1996; Yanal, 1988; Wright, 1989; B.A. Wilson, 1986).

I have shown in this part of the paper how the application of evaluative skills (e.g. the construction of counterexamples) is necessary at the initial interpretive stage. Despite our current pedagogical practice, we should thus teach such fundamentals at the very beginning of our courses or textbooks for a number of reasons. Students will be better able to apply the Principle of Charity; distinguish arguments from non-arguments, and arguments from causal explanations; identify the function of statements when inference indicators are absent; identify the words that need to be clarified; and diagram reasoning. By *appropriately* introducing the evaluative skills sooner, students will have greater opportunities to apply some simple but powerful techniques to evaluate support early in the course, and to apply them to gradually more complex cases as the course progresses. They will thus have the practice necessary to master these skills.

I have described our typical pedagogical mistake of teaching certain evaluative skills too late in our courses or textbooks. I will next describe a further weakness common to the great majority of courses and textbooks.

II

The Fragmentation of Thinking Skills

Imagine an athlete whose diligent training for a sport (e.g. soccer, dance, gymnastics, baseball, etc.) or a musical instrument consisted *only* of exercising his/her muscles *in isolation from one another*, and mastering specific movements *in isolation from one another*. The consequence of course is that despite the intensive training his/her performance of the sport would be totally uncoordinated. One would even easily have the impression that the athlete had not been training. Of course we would never think of subjecting an athlete or musician to that kind of training, yet how do we typically train the minds of our students in our schools, colleges, and universities?

There is a very serious and unfortunately very common problem in the way in which we *typically* teach reasoning skills in critical thinking courses and textbooks. It consists of

1) teaching one skill or standard at a time
2) in isolation from all or most of the other skills and standards with which it naturally clusters, and
3) testing it in isolation from those skills.

What generally happens with this *fragmentation* of skills is that students can do well in each lesson, unit, or chapter, they might excel in the quizzes and tests, and they might even master each specific skill, but when they are challenged to apply their skills to real life messy situations – where many skills must be *appropriately orchestrated* – they usually perform quite badly. Too

often their performance is so bad that one would even easily have the impression that they had hardly learned anything. It is rather puzzling and disturbing that these common results continue to surprise us, and yet we would not be surprised by a similarly bad performance of an uncoordinated athlete whose diligent training had consisted only of exercising his/her muscles in isolation from one another.

A suggestion to address the fragmentation

If we are to teach critical thinking effectively, we need to bear in mind that *clusters of interdependent skills and standards* are involved in any competent performance of a complex intellectual task, and consequently, that we must teach them in such a way so as to avoid the fragmented learning of those skills. However, just as balanced physical training does not exclude the isolated training of muscles or movements, similarly, a holistic approach to teaching thinking skills does *not* exclude teaching, at the appropriate time and for the appropriate length of time, a specific skill in isolation from other skills with which it naturally clusters.

One way to make those changes is to teach students groups of questions that orchestrate interdependent skills and standards. Since I work in the area of argumentation and logic, and since the skills necessary to construct and evaluate arguments (and inferences) are typically taught in a fragmented way in textbooks and courses, I will illustrate this questioning process with respect to argument evaluation. The general strategy that I have found effective is to have students apply (and discover) a core group of questions by first applying them to simple arguments that they can easily evaluate, and then to increasingly more complex arguments as the course progresses. Students thus have a good idea of the "big picture" from the very beginning of the course, and as it advances, the questions become gradually more complex because we teachers incorporate the new material into the questions. By always relating new material to the "big picture", students understand how the new skills, standards, and concepts work *together* in the evaluation and construction of arguments.

Here is an example of a group of questions that give the "big picture" for evaluating arguments.[2]

1) What is the conclusion? What is the person trying to convince me to believe or do?

How strongly stated is the conclusion?

2) What is/are the reason(s)/premise(s)? What provides the support/evidence?

How strongly stated are the premises?

3) How do the reason(s) and conclusion interconnect? (For example, how do we map out Einstein's reasoning? How could we visually represent it?) (The ability to answer the first three questions requires various skills: to interpret an author's

[2] A similar approach is presented in the textbooks of Scriven (1976), Browne and Keeley (1981), Nosich (1982), Hitchcock (1983), Rudinow (1990), Ennis (1996), Cederblom and Paulsen (2001). The problem is that either they introduce it too late in their textbooks, or if they do introduce it early, either it is presented in a fragmented way, or new material is not effectively integrated and tested into the general approach.

or a speaker's intended use of statements; identify the argumentative function of various words, e.g. "so", "since", "hence"; "although", "yet", "nevertheless"; consider the most charitable interpretation, which in turn requires the ability to assess the support of premises, etc.)

4) Are there any words whose ambiguity or vagueness significantly affects either the truth or support of the premises, or the truth of the conclusion (This skill requires various skills pertaining to the assessment of the support or truth of statements.)

5) Are there any unstated (unexpressed, hidden, missing, tacit, implicit, suppressed) premises? (This skill requires various skills pertaining to interpreting the *intended* support for the conclusion; assessing the actual support and the relations among concepts; applying the principle of charity.)

6) What is the strength of support of the premises? (This skill requires the abilities to use different kinds of counterexamples, and to estimate their probability; to identify different kinds of valid and invalid forms; to use samples and statistics, etc.)

7) Are the given premises and unstated assumptions true? How probable are they?

(This skill requires the ability to identify consistent statements; to appeal to appropriate authorities, to estimate probabilities; to use counterexamples, etc..)

8) What are the strongest opposing views against the truth of the conclusion? against the truth of the premises or against the support of the premises? (This skill requires the ability – and disposition – to apply impartially and fairly the standards of reasoning to one's own reasoning, and any relevant information, even if it weakens one's own position.)

9) Given one's answers to the preceding questions, what is the likelihood of the truth of the final conclusion?

Note that the order of the questions is *not* be rigid. The actual order in which one raises these questions depends on one's ability to use *all* the relevant information to answer each question. But we rarely have all the relevant information all at once as we begin to analyze an argument. For example, we typically notice the need to clarify some words only after beginning to evaluate the truth or the degree of support of premises. The order in which we raise the questions is also influenced by the complexity of an argument. For example, when an argument has only one premise, there is not need to determine whether its premises are dependent or independent.

One way to help our students to retain these questions is to use the following acronym: CRICISTO: **C**onclusion **R**eason **I**nterconnect **C**larity **I**mplicit **S**trength **T**ruth **O**pposing view (**O**ther perspectives, **O**verall evaluation). We need to remind our students that though the acronym has a definite order for the purpose of helping us recall the questions, the application of these questions need not follow that order.

We have been examining one way of devising a *holistic questioning process* for guiding the evaluation of arguments. If we do not group these questions in the way these skills naturally cluster, we will be committing the same pedagogical mistake found in the majority of critical thinking textbooks, programs, and teaching approaches: the teaching of fragmented skills, which

typically hinders the learning of complex skills constructed from specific skills. We have also examined a few ways of teaching this questioning process.

Of course an integral approach to teaching the ways to assess arguments (and explanations) does *not* eliminate the use of exercises that focus exclusively on a specific skill. However, after the practice of a specific skill, an integrated approach would always give students the opportunity to apply their newly acquired or improved skills *with all the other relevant skills* in performing a more complex task, just as an athlete who exercises specific muscles or movements will afterwards participate in his/her sport to integrate those improved muscles and movements into a coordinated performance. We need to balance the holistic and focused approaches.

In the first part of this paper I described various ways in which the effective and efficient execution of *interpretive* skills in the evaluation of arguments and causal explanations requires the successful application of skills used to *evaluate* either the truth or support of premises. Nevertheless, we typically teach the former *before* the latter. In the second part I showed one way of integrating the teaching of both interpretive and evaluative skills in a manner that would overcome this improper order of teaching the material, and that would help to diminish our students' fragmented learning of reasoning skills.

References

Acock, Malcolm (1985) *Informal Logic Examples and Exercises*, Belmont, Calif.: Wadsworth.

Barker, Evelyn M. (1981) *Everyday Reasoning*, Englewood Cliffs: Prentice-Hall.

Barker, Stephen F. (1965) *The Elements of Logic*, New York: McGraw-Hill.

Barry, Vincent. (1983) *Good Reason for Writing*, Belmont, Calf.: Wadsworth.

Barry, Vincent E., Soccio, Douglas J. (1988) *Practical Logic*, 3rd ed., New York: Holt, Rinehart and Winston.

Beardsley, Monroe (1975) *Thinking Straight, Principles of Reasoning for Readers and Writers*, 4th ed. Englewood Cliffs, N.J.: Prentice-Hall.

Bedau, Hugo (1996) *Thinking and Writing about Philosophy*, Boston: Bedford Books of St. Martin's Press.

Bickenbach, Jerome E., Davies, Jacqueline (1997) Good reasons for better Arguments. An Introduction to the skills and values of critical thinking, Peterborough, Ontario: Broadview Press.

Bierman, Arthur K., Assali, Robin N. (1996) *The Critical Thinking Handbook*, Upper Saddle River, N.J.: Prentice Hall.

Black, Max. (1946) Critical Thinking. An Introduction to Logic and Scientific Method, N.Y.: Prentice-Hall.

Brandon, Ed. (1983) *Argument Analysis*, University of West Indies, Mona, School of Education.

Browne, M. Neil, Keeley, Stuart M. (1990) *Asking the Right Questions. A Guide to Critical Thinking*, 3rd ed., Englewood Cliffs, N.J.: Prentice-Hall.

Carey, Stephen S. (2000) *The Uses and Abuses of Argument*, Mountain View,Calif.: Mayfield.

Carter, K. Codell. (1977) *A Contemporary Introduction to Logic with Applications*, Beverly Hills: Glencoe Pross.

Cannavo, S. (1998) *Think to Win*, Amherst, N.Y.: Prometheus Books.

Cederblom, Jerry, Paulsen, David W. (2001) *Critical Reasoning*, 4th ed. Belmont, Calif.: Wadsworth.

Chaffee, John. (1997) *Thinking Critically*. 5th ed., Boston, N.Y.: Houghton Mifflin Co.

Cogan, Robert. (1998) *Critical Thinking, Step by Step*, Lanham, Maryland: University Press of America.

Conway, David A., Munson, Ronald. (2000) *The Elements of Reasoning*, Belmont, Calif.: Wadsworth/Thomson Learning

Crusius, Timothy W., Channell, Carolyn E. (1995) *The Aims of Argument. A Brief Rhetoric*, Mountain View, Calif.: Mayfield.

Cohen, Elliot. (1994) Caution: Faulty Thinking Can be Harmful to Your Happiness. Logic for Everyday Living, 2nd ed., Fort Pierce, Fl.: Trace-WilCo Publishers.

Cohen, Morris R., Nagel, Ernest. (1934) *An Introduction to Logic and Scientific Method*, N.Y.: Harcourt Brace & Co.

Copi, Irving. (1986) *Introduction to Logic*, 7th ed., N.Y.: Macmillan Publishing Co.

Copi, Irving, Burgess-Jackson, Keith. (1992) *Informal Logic*, 2nd ed., N.Y.: Macmillan Publishing Co.

Creighton, James Edwin. (1913) *An Introductory Logic*, 3rd ed., London: Macmillan Co.

Damer, T. Edward. (1987) *Attacking Faulty Reasoning*, 2nd ed., Belmont, Calif.: Wadsworth.

Dauer, Francis Watanabe. (1989) *Critical Thinking. An Introduction to Reasoning*, N.Y.: Barnes & Noble Books.

DeWitt Spurgin, Sally (1994) *The Power to Persuade. A Rhetoric & Reader for Argumentative Writing*, Englewood Cliffs, N.J.: Prentice Hall.

Dowden, Bradley, H. (1993) *Logical Reasoning*, Belmont California: Wadsworth.

Diestler, Sherry. (1994) Becoming a Critical Thinker. A User Friendly Manual. N.Y.: Macmillan.

Ehninger, Douglas. (1974) *Influence, Belief, and Argument*, Glenview, Illinois: Scott, Foresman and Co.

Emmet, E.R. (1960) *The Use of Reason*, London: Longmans.

Engel, S.Morris. (2000) *With Good Reason. An Introduction to Informal Fallacies*, 6th ed., Boston: Bedford/St.Martin's.

Ennis, Robert H. (1996) *Critical Thinking*, Upper Saddle, NJ: Prentice-Hall.

Epstein, Richard L. (1999) *Critical Thinking*, Belmont, Calif.: Wadsworth.

Fearnside, W. Ward. (1980) *About Thinking*, Englewood Cliffs, N.J.: Prentice-Hall.

Fogelin, Robert J., Sinnott-Armstrong,Walter. (1997) *Understanding Arguments. An Introduction to Informal Logic*, 5th ed., Fort Worth…: Harcourt Brace College Publishers.

Freeley, Austin J. (1993) Argumentation and Debate. Critical Thinking for Reasoned Decision Making, 8th ed., Belmont, Calif.: Wadsworth.

Freeman, James. (1988) *Thinking Logically. Basic Concepts for Reasoning*. Englewood Cliffs, NJ: Prentice Hall.

Freeman, James. (1993) *Thinking Logically. Basic Concepts for Reasoning*, 2nd ed. Englewood Cliffs, NJ: Prentice Hall.

Fulkerson, Richard. (1996) *Teaching the Argument in Writing*, Urbana, Illinois: National Council of Teachers of English.

Govier, Trudy. (1997) *A Practical Study of Argument*, 3rd ed., Belmont, Calif.: Wadsworth.

Grennan, Wayne. (1984) *Argument Evaluation*, Lanham, MD: University Press of America.

Groarke, Leo A., Tindale, Christopher W., Fisher, Linda. (1996) *Good Reasoning Matters. A Constructive Approach to Critical Thinking*, 2nd ed., Toronto: Oxford U.P.

Gutteridge, Moira. (1995) *Constructive Critical Thinking*, Toronto: Harcourt Brace & Company.

Hammond, Eugene. (1989) *Critical Thinking, Thoughtful Writing*, 2nd ed., New York: McGraw-Hill Inc.

Harnadek, Anita. (1979) *Critical Thinking, Book One*, Pacific Grove, Calif.: Midwest Publications.

Hatcher, Donald L., Spencer, L. Anne (1993) *Reasoning and Writing. An Introduction to Critical Thinking*, Lanham, Maryland: Rowman & Littlefield Publishers Inc.

Herrick, James A. (1991) *Critical Thinking. The Analysis of Arguments*, Scottsdale, Arizona: Gorsuch Scarisbrick, Publishers.

Hiat, Donald A. (1975) *True, False, or In Between. An Elective Course in Logical Thinking*, Lexington, Massachusetts: Ginn and Company (Xerox Corporation).

Hill, Bill, Leeman, Richard W. (1997) *The Art and Practice of Argumentation and Debate*, Mountain View, Calif.: Mayfield Publishing Co.

Hinderer, Drew E. (1992) *Building Arguments*, Belmont, Calif.: Wadsworth.

Hintikka, Jaakko, Bachman, James. (1991) What if…? Toward Excellence in Reasoning, Mountain View, Calif.: Mayfield.

Hitchcock, David. (1983) Critical Thinking. A Guide to Evaluating Information, Toronto: Methuen.

Hoaglund, John. (1995) *Critical Thinking*, 2nd ed., Newport News, Virginia: Vale Press.

Hughes, William. (1997) *Critical Thinking*, 2nd ed., Peterborough, Ontario: Broadview Press.

Hurley, Patrick J. (1991) *A Concise Introduction to Logic*, Belmont, California: Wadsworth.

Jensen, J. Vernon. (1981) *Argumentation. Reasoning in Communication*. New York: Van Nostrand Co.

Johnson, Ben E. (1998) *Stirring up Thinking*, Boston: Houghton Mifflin Co.

Johnson, Robert M. (1987) *A Logic Book*, Belmont, Calif.: Wadsworth.

Johnson, Ralph H., Blair J. Anthony. (1983) *Logical Self-Defense*, 2nd ed., Toronto: McGraw Hill-Ryerson.

Kahane, Howard, Cavender, Nancy. (1998) *Logic and Contemporary Rhetoric*, 8th ed., Belmont, Calif.: Wadsworth Publishing Company.

Kegley, Charles W., Kegley, Jacquelyn Ann. (1984) *Introduction to Logic*, Lanham, MD: University Press of America.

Kelley, David. (1998) *The Art of Reasoning*, 3rd ed., N.Y.: W.W.Norton.

Kelly, Stewart E. (2001) *Thinking Well. An Introduction to Critical Thinking*, Mountain View, Calif.: Mayfield.

Kim, John C.S. (1994) *The Art of Creative Critical Thinking*, Lanham, MD: University Press of America.

Kirby, Gary R., Goodpaster, Jeffrey R. (1999) *Thinking*, 2nd ed., Upper Saddle River, N.J.: Prentice Hall.

Lambert, Karel, Ulrich, William. (1980) The *Nature of Argument*, New York: Macmillan Publishing Co., Inc.

Leblanc, Jill. (1998) *Thinking Clearly*, N.Y. W.W. Norton.

Levy, David A. (1997) *Tools of Critical Thinking*. Metathoughts for Psychology, Boston: Ally & Bacon.

Little, Frederick J. (1980) *Critical Thinking and Decision Making*, Toronto: Butterworth.

Luckhardt, C. Grant, Bechtel,William. (1994) *How to Do Things with Logic*, Hillsdale, N.J.: Lawrence Erlbaum Associates

MacKinnon, Edward. (1985) *Basic Reasoning*, Englewood Cliffs, N.J.: Prentice-Hall.

McKay, Thomas. (2000) *Reasons, Explanations, and Decisions*, Toronto: Wadsworth Thomson Learning.

Makau, Josina M. (1990) Reasoning and Communication. Thinking Critically about Arguments, Belmont, Calif.: Wadsworth.

Malone, Michael, Sherry, David. (1998) *Inference and Implicatin. An Introduction to Logical Analysis*, Dubuque, Iowa: Kendall/Hunt Publishing Co.

Mayfield, Marlys. (1994) Thinking for Yourself. Developing Critical Thinking Skills Through Reading and Writing, 3rd ed., Belmont, Calif.: Wadsworth.

Mendelsohn, Richard L., Schwartz, Lewis M. (1987) *Basic Logic*, Englewood Cliffs, N.J.: Prentice-Hall.

Miller, Richard W. (1990) *Study Guide to Introduction to Logic* 8th ed., N.Y.: Macmillan.

Missimer, Connie A. (1990) *Good Arguments. An Introduction to Critical Thinking*, 2nd ed., Englewood Cliffs, N.J.: Prentice-Hall.

Moore, Brooke Noel (1995) Making Your Case. Critical Thinking and the Argumentative Essay. Mountain View: Mayfield.

Moore, Brooke Noel, Parker, Richard (2001) *Critical Thinking*, 5th ed. Mountain View California: Mayfield.

Moore, Kathleen Dean. (1993) *Reasoning and Writing*, New York: Macmillan Publishing Co.

Moore, Edgar W. (1967) *Creative and Critical Thinking*, Boston: Houghton Mifflin Co.

Munson, Ronald. (1976) *The Way of Words. An Informal Logic*, Boston: Houghton Mifflin Co.

Munson, Ronald, Conway, David A. (2000) *Basics of Reasoning*, Belmont, Calif: Wadsworth.

Nolt, John Eric. (1984) *Informal Logic. Possible Worlds and Imagination*, New York: McGraw-Hill Book Co.

Nosich, Gerald. (1982) *Reasons and Arguments*, Belmont, Calif.: Wadsworth.

Olshewsky, Thomas M. (1983) *Good Reasons and Persuasive Force. A Pragmatic Approach*, Lanham, MD: University Press of America.

Pinto, Robert C., Blair, J. Anthony, Parr, Katharine E. (1993) *Reasoning, A Practical Guide for Canadian Students*, Scarborough, Ontario: Prentice-Hall.

Pinto, Robert C., Blair, J. Anthony. (1993) *Reasoning. A Practical Guide*, Englewood Cliffs, N.J.: Prentice Hall.

Purtill, Richard L. (1972) *Logical Thinking*, New York: Harper & Row Publishers.

Purtill, Richard L. (1989) *A Logical Introduction to Philosophy*, Englewood Cliffs, N.J.: Prentice Hall.

Rasool, Joan, Banks, Caroline, McCarthy, Mary-Jane. (1993) *Critical Thinking. Reading and Writing in a Diverse World*, Belmont, Calif.: Wadsworth.

Reichenbach, Bruce R. (2001) *Introduction to Critical Thinking*, New York: McGraw Hill.

Rieke, Richard D., Sillars, Malcolm O. (1984) *Argumentation and Decision Making Process*, 2nd ed., New York: Haper Collins Publishers.

Romain, Dianne. (1997) Thinking Things Through. Critical Thinking for Decisions You Can Live With, Mountain View, Calif.: Mayfield.

Rudinow, Joel, Barry, Vincent E. (1994) Invitation to Critical Thinking, 3rd ed., Forth Worth: Harcourt Brace College Publishers.

Ruggiero, Vincent Ryan. (1988) *The Art of Thinking. A Guide to Critical and Creative Thinking*, New York: Harper and Row Publishers.

Runkle, Gerald. (1991) *Good Thinking. An Introduction to Logic*, Fort Worth: Holt, Rinehart and Winston Inc.

Russow, Lilly-Marlene, Curd, Martin. (1989) *Principles of Reasoning*, New York: St. Martin's Press, Inc.

Rybacki, Karyn C., Rybacki, Donald J. (1986) *Advocacy and Opposition. An Introduction to Argumentation*, Englewood Cliffs, N.J.: Prentice-Hall.

Salmon, Merrillee H. (1995) *Introduction to Logic and Critical Thinking*, 3rd ed., Fort Worth: Harcourt Brace College Publishers.

Schwartz, Stephen P. (1994) *Fundamentals of Reasoning*, New York: Macmillan.

Schwartz, Thomas. (1980) *The Art of Logical Reasoning*, New York: Random House.

Schwarze, Sharon, Lape, Harvey (1997) *Thinking Socratically*, Upper Saddle River, N.J.: Prentice Hall.

Scriven, Michael. (1976) *Reasoning*, New York: McGraw-Hill Book Co.

Seech, Zachary (1988) *Logic in Everyday Life. Practical Reasoning Skills*, Belmont, Calif.: Wadsworth.

Seech, Zachary (1993) *Open Minds and Everyday Reasoning*, Belmont, Calif.: Wadsworth.

Shaw, Patrick. (1997) *Logic and Its Limits*, 2nd ed., Oxford, New York: Oxford University Press.

Stay, Byron L. (1996) *A Guide to Argumentative Writing*, San Diego, Calif.: Greenhaven Press.

Sproule, J. Michael. (1980) *Argument. Language and Its Influence*, New York: McGraw-Hill Book Co.

Stratton, Jon. (1999) *Critical Thinking for College Students*, Lanham, Maryland: Rowman & Littlefield Publishers, Inc.

Teays, Wanda. (1996) *Second Thoughts. Critical Thinking from a Multicultural Perspective*, Mountain View, Calif.: Mayfield Publishing Co.

Thomson, Anne. (1996) *Critical Reasoning. A Practical Introduction*. London, New York: Routledge.

Thomas, Stephen Naylor (1997) *Practical Reasoning in Natural Language*, Upper Saddle River, NJ: Prentice-Hall.

Toulmin, Stephen, Rieke, Richard, Janik, Allan. (1984) *An Introduction to Reasoning*. 2nd ed. New York: Macmillan Pub. Co. Inc.

Waller, Bruce N. (1998) *Critical Thinking. Consider the Verdict*. 3rd ed. Upper Saddle River, NJ: Prentice Hall.

Walton, Douglas N. (1989) *Informal Logic. A Handbook for Critical Argumentation*, N.Y.: Cambridge University Press.

Warwick, Barbara, Inch, Edward S. (1994) *Critical Thinking and Communication*, 2nd ed., New York: Macmillan Publishing Company.

Weddle, Perry. (1978) *Argument. A Guide to Critical Thinking*, New York: McGraw-Hill Book Co.

Wilson, Barrie A. (1986) *The Anatomy of Argument*, Revised Edition, Lanham, MD: University Press of America.

Wilson, David C. (1999) *A Guide to Good Reasoning*, Boston…: McGraw-Hill.i

Woods, John, Walton, Douglas (1982) *Argument: The Logic of the Fallacies*, Toronto: McGraw-Hill Ryerson Ltd.

Wright, Larry. (1989) *Practical Reasoning*, San Diego: Harcourt Brace Janovich

Yanal, Robert J. (1988) *Basic Logic*. St. Paul, MN: West Publishing Co.

Zechmeister, Eugene B. (1992) *Critical Thinking. A Functional Approach*. Pacific Grove, Calif.: Broks/Cole Publishing Co.

Ziegelmueller, George W., Kay, Jack. (1997) *Argumentation. Inquiry & Advocacy*. 3rd ed. Boston: Allyn and Bacon.