

# Heidelberg College

DEPARTMENT OF PHILOSOPHY

January 18, 2005

TO: Dave Weininger, Assessment Coordinator

FROM: Daryl Close

RE: Analysis of Cornell Critical Thinking Test, Level Z

## Introduction:

This memo is in response to your request of 13-Dec-2004 to provide IRC and the Assessment Coordinator with a general overview of the *Cornell Critical Thinking Test, Level Z* (hereafter, CCTT). Specifically, you indicate in your request that “it would be very beneficial to have a description of the critical thinking skills that the Cornell Test measures.”

In order to place my CCTT analysis in context, my response below will consist of three parts. First, I will briefly review the history of critical thinking in the Heidelberg College general education core curriculum. Second, I will describe the general concept of critical thinking and the assessment of critical thinking skills in the U. S. undergraduate curriculum. Third, I will identify the underlying critical thinking concepts in the seven sections of the CCTT. My goal is to assist Heidelberg faculty and administrators in understanding the nature and scope of the College’s commitment to teaching critical thinking skills to our undergraduates.

## Part 1: Critical Thinking at Heidelberg

An explicit commitment to teaching critical thinking skills is not new to Heidelberg College. It dates back many years. For more than 20 years, College catalogs have identified “powers of reasoning” and “critical judgment” as part of the educational mission. Throughout the 1990s one of the Institutional Objectives has been “to provide opportunities for the development of *critical thinking* [emphasis added] and problem-solving abilities and skills.”<sup>1</sup> These expressions existed until the current year’s catalog (2004-2005). In the new mission documents, approved by the Board of Trustees in Fall 2003, the expressions “powers of reasoning” and “critical judgment” no longer appear, but the commitment to critical thinking remains, although in slightly different form:

At the time of graduation, Heidelberg students will be capable of [d]emonstrating the breadth of knowledge and creative and critical thinking skills to fully participate as citizens of the changing world;<sup>2</sup>

Despite the long history of “critical thinking” in formal institutional statements, the 1999 *General Education Curriculum*, implemented in Fall 2001, makes no mention of critical thinking skills, powers of reasoning, or

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<sup>1</sup>“Institutional Objectives,” 1996-1997 *Heidelberg College Catalog*. Tiffin, OH: Heidelberg College, 1996, 10.

<sup>2</sup>“Statement of Institutional Goals,” 2004-2005 *Heidelberg College Catalog*. Tiffin, OH: Heidelberg College, 2004, 10.

critical judgment. In fact, not until December 2004 did the Faculty approve a General Education graduation requirement that explicitly includes critical thinking, and even there, the course is experimental and is at best of limited value in addressing the critical thinking goal stated in the current catalog.

Following IRC's 2003 report of very poor critical thinking results on nationally normed student assessment instruments, then Interim Vice President for Academic Affairs Kathryn Venema formally announced at the August 2003 faculty meeting that critical thinking was a "priority concern" to the College. A campus-wide workshop on critical thinking was conducted by critical thinking consultant Robert Ennis in October 2003. In order to build an adequate curricular response to the College's critical thinking goal, the Faculty must now develop a clear sense of what critical thinking means in an undergraduate general education program.

## Part 2: What Is Critical Thinking?

Critical thinking is a fairly well-defined set of abilities. Critical thinking first appeared in the U. S. undergraduate curriculum under that heading shortly after the Second World War and has been a subject of considerable research since then. The first textbook with the title "Critical Thinking" appeared in 1946.<sup>3</sup> Since that time, scores of critical thinking textbooks have appeared in support of general education courses in critical thinking. Reviewing those textbooks reveals a surprisingly stable set of common objectives.

Consequently, defining critical thinking is not nearly the impossible task that some might think. Beginning with Robert H. Ennis' seminal 1962 paper, "A Concept of Critical Thinking,"<sup>4</sup> there has been a continuous and productive literature regarding the nature of critical thinking and its assessment in the classroom. While there are ongoing debates about the precise boundaries of the concept of critical thinking—e.g., should the concept be limited to critical thinking abilities or should critical thinking dispositions be included?—there is a common core of component abilities about which there is little or no controversy.<sup>5</sup> In thousands of classrooms across the country, faculty from a wide variety of disciplines work to improve their students' critical thinking abilities.

A substantial increase in the sheer number of critical thinking courses occurred in the early 1980s as a result of California State University Chancellor Glenn Dumke's Executive Order 338. This order mandated critical thinking instruction for all CSU system undergraduates. Affecting hundreds of thousands of students—now extended to pre-college students as well—Executive Order 338 states in part that

Instruction in critical thinking is to be designed to achieve an understanding of the relationship of language to logic, which should lead to the ability to analyze, criticize, and advocate ideas, to reason inductively and deductively, and to reach factual or judgmental conclusions based on sound inferences drawn from unambiguous statements of knowledge or belief. The minimal competence to be expected at the successful conclusion of instruction in critical thinking should be the ability to distinguish fact from judgment, belief from knowledge, and skills in elementary inductive and deductive processes, including an understanding of the formal and informal fallacies of language and thought.<sup>6</sup>

The language of Executive Order 338 is useful to Heidelberg faculty in that it summarizes the standard conception of critical thinking. Additionally, because Robert Ennis' conception of critical thinking has played

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<sup>3</sup>Max Black, *Critical Thinking: An Introduction to Logic and Scientific Method*. New York: Prentice-Hall, 1946.

<sup>4</sup>Robert H. Ennis, "A Concept of Critical Thinking," *Harvard Educational Review* 32:1 (1962), 161-178.

<sup>5</sup>This is quite an important political point in facilitating faculty understanding of what constitutes critical thinking. Critical thinking is simply not available for a negotiated definition, unless we would be prepared to develop our own assessment tools for a local, idiosyncratic conception of critical thinking. Such an approach would be odd, at the very least.

<sup>6</sup>As quoted in Donald Lazere, "Critical Thinking in College English Studies," *ERIC Digest*. Urbana, IL: ERIC Clearinghouse on Reading and Communication Skills, 1987. ERIC Identifier: ED284275.

such a central role in the literature over the past 40 years, Ennis' widely cited "streamlined" definition of critical thinking should be noted:

*Working Definition:* 'Critical thinking' means reasonable reflective thinking that is focused on deciding what to believe or do.<sup>7</sup>

However, useful the abbreviated definition above may be, in order to understand the question content of the CCTT, we must look at Ennis' full definition of critical thinking. On his analysis, the ideal critical thinker exhibits an "overlapping set" of 12 dispositions and 16 abilities. *Dispositions* include being clear about the intended meaning of what is communicated, seeking and offering reasons, being reflectively aware of one's own basic beliefs, being open-minded, withholding judgment when evidence is insufficient, etc., and are not explicitly assessed by the CCTT.

Ennis' 16 critical thinking *abilities*, on the other hand, are organized into four constitutive categories: clarification abilities, evidence judging abilities, inference abilities, metacognitive abilities such as hypothetical thinking, and a fifth category of four "auxiliary" critical thinking abilities. This latter category includes abilities that are not constitutive of critical thinking such as being sensitive to the feelings and knowledge of other persons, employing appropriate rhetorical strategies in written and oral communication, etc.<sup>8</sup> Several sub-skills in the four constitutive categories are readily identifiable in the CCTT.

### Part 3: Critical Thinking Assessment and the *Cornell Critical Thinking Test, Level Z*

There are many critical thinking assessment instruments of varying types. The CCTT can be categorized as "general content," using content and experiences from a number of subject matter areas, and "multi-aspect," assessing several aspects of critical thinking rather than one particular ability, e.g., the ability to identify the main conclusion of an argumentative passage.<sup>9</sup> A number of studies have been conducted both of Level X (grade school) and Level Z that support strong appraisals of construct validity. For example, the CCTT (viz., Level Z) did as well as the *Graduate Record Exam* and the *Miller Analogies Test* in predicting graduate school success.<sup>10</sup> A 1970 factor analysis study comparing the CCTT with the *Watson-Glaser Critical Thinking Appraisal*, Form Zm and *A Test of Critical Thinking*, Form G, supported a premise of the CCTT that critical thinking ability is heterogeneous and not a general ability.<sup>11</sup> The CCTT Manual points out that there is "no definitive establishment of the construct validity of the Level Z—or any critical thinking test . . . The user must consider all aspects, especially the items and their answers, and exercise critical thinking in making a judgment."<sup>12</sup>

The CCTT, Level Z, consists of 52 items and is divided into seven sections:

- Section I: Deduction, Items 1-10
- Section II: Semantics, Items 11-21
- Section III: Credibility, Items 22-25

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<sup>7</sup>Robert Ennis, "Critical Thinking: A Streamlined Conception," *Teaching Philosophy* 14:1 (March 1991), 5-23.

<sup>8</sup>*Ibid.*, 8-10. Ennis' complete list of dispositions and abilities is attached to this paper as Appendix A.

<sup>9</sup>Robert H. Ennis, "An Annotated List of Critical Thinking Tests," Champaign, IL: University of Illinois, 2003. <http://faculty.ed.uiuc.edu/rhennis>. Distributed to Heidelberg faculty in "Critical Thinking at Heidelberg: Some Relevant Documents," 10/21/2003. Available at <http://courses.heidelberg.edu/dclove/admin/criticalthinking/rhennis.pdf>

<sup>10</sup>Robert H. Ennis, Jason Millman, and Thomas N. Tomko, *Cornell Critical Thinking Tests Level X & Level Z Manual*. 3d ed. Pacific Grove, CA: Critical Thinking Books & Software, 1985, 15-22.

<sup>11</sup>*Ibid.*, 21.

<sup>12</sup>*Ibid.*, 22.

- Section IV: Induction (Judging Conclusions), Items 26-38
- Section V: Induction (Planning Experiments), Items 39-42
- Section VI: Definition and Assumption Identification, Items 43-46
- Section VII: Assumption Identification, Items 47-52

Rather than analyze each test item, I will comment on each section in general terms. The reader may find it useful to review the 12 constituent critical thinking abilities in Appendix A of this document. I strongly recommend having a copy of the Level Z test at hand for reference in reviewing the comments below.

## Section I: Deduction

These items *do not* require the student to identify the conclusion of a passage, since it is underlined. Rather, the student is asked to determine simply whether the conclusion *follows necessarily* from the supporting statements, *contradicts* the supporting statements, or *neither*. Understanding deductive reasoning is not something that can be accomplished in one or two 50 minute lectures. However, the level of understanding required in Section 1 is very general, so critical distinctions that are frequently conflated in ordinary language, e.g., the distinction between validity and soundness, are not needed to correctly answer questions in Section 1. Here is a short list of abilities needed in Section 1.

1. Understands the basics of deductive reasoning, in particular, the concept of *following necessarily* (deductive validity). This is explained in the instructions, but presumably is a reminder or a stipulation, much like the mathematical formulas provided in the SAT-I instructions. If you don't already understand those formulae, you're probably not going to be able to apply them from simply having read them in the instructions.

Moreover, deductive validity is an inherently *conditional* concept, viz., *if* the supporting statements (premises) are true, then the conclusion *must* be true, of necessity. That one or more of the premises (or the conclusion) are in fact false does not show that the conclusion fails to follow necessarily. For example, the conclusion, "President Clinton is dead" follows necessarily from the statements, "President Clinton was assassinated," and "If President Clinton was assassinated, then President Clinton is dead." The latter supporting statement is actually true, while the former is false (and will remain so, one hopes). Learning the conditional nature of reasoning requires substantial practice.

2. Understands the concept of *contradiction*, as opposed to contraries, differing opinions, etc. This is explained in the instructions, but the same comment as in (1) above applies.
3. Understands quantifier terms such as "anyone," "many," "most," "all," "any," "always," etc., and can identify implicit references to quantifiers. For example, in Item 9, the implied quantifier "all" modifies "people" in the expression, "people who make trouble ought not to be admitted."
4. Understands the difference between logical implication and speaker assertion. For example, in Item 7, the speaker asserts with great certainty that the conclusion follows from the supporting statements, but the speaker is wrong.
5. Understands that logical relationships among statements are not grounded in human emotions or beliefs. Hence, the example in Comment 1 above remains just as valid if we substitute the statements, "A human zygote is a person under the Ohio Constitution," and "Premeditated destruction of a human zygote should be a capital offense in Ohio" are substituted for "President Clinton was assassinated" and "President Clinton is dead," respectively.

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## Section II: Semantics

This section involves what are known as “informal fallacies.”<sup>13</sup> There are six types represented, although the questions themselves group them more roughly and by description rather than by name. For example, the test uses the descriptive term “using a word in two different ways,” rather than “fallacy of equivocation.” Students who have learned the fallacy of equivocation know that its definition is “using a word or expression in two or more different ways.” Since informal fallacies often make up a substantial part of a critical thinking course or course component, I have listed each item below with its associated fallacy. Informal fallacies are very common in ordinary speech and writing, and students enjoy learning to identify them.

- Item 11: Ad hominem fallacy (abusive) – CCTT: “using emotive language”
- Item 12: Fallacy of equivocation – CCTT: “using a word in two different ways”
- Item 13: Fallacy of equivocation – CCTT: “not using ‘know’ in its ordinary sense [throughout the passage]”
- Item 14: Fallacy of equivocation – CCTT: “using a word in two ways”
- Item 15: Fallacy of false dilemma – CCTT: “Algan hasn’t shown that there are only two alternatives”
- Item 16: Fallacy of equivocation – CCTT: “Dobert and Algan are using the same word differently”
- Item 17: Fallacy of hasty generalization (fallacy of small sample) – CCTT: “One such comparison is not enough to prove such a statement”
- Item 18: Fallacy of equivocation – CCTT: “using the same word in two ways”
- Item 19: Fallacy of stipulative definition (and straw man fallacy, as well) – CCTT: “Algan has made the word ‘safe’ useless for communicating information”
- Item 20: Fallacy of false dilemma – CCTT: “Dobert hasn’t shown that there are only two alternatives”
- Item 21: Fallacy of equivocation – CCTT: “using a word in two different ways”

Sections III, IV, and V are all based on the ducklings-eat-cabbage-worms-and-die scenario, with various experimental variations relevant to each test section. Sections IV and V comparable to Section I because they are concerned with inductive reasoning, per se, as opposed to deductive reasoning. This inclusion of inductive reasoning is one of the most distinctive features of critical thinking curricula, compared to a symbolic logic course that is concerned almost exclusively with deductive reasoning.

Inductive reasoning is usually associated with the Scientific Revolution, and of course, scientists regularly employ both deductive and inductive logic. Inductive logic has been erroneously defined in the past as arguing from the specific to the general, but argument by enumeration is just one variety of induction. Statistical “syllogisms,” for example, argue from the general to the specific. For instance, one can argue that Mary is wealthy from the premises that Mary is a banker and that most bankers are wealthy. What characterizes

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<sup>13</sup>See my short list of common informal fallacies in Appendix B. The distinction between formal and informal fallacies is a pragmatic one and my list includes some common formal fallacies such as the fallacy of denying the antecedent, and the fallacy of conversion.

inductive reasoning, then, in contrast to deductive reasoning, is that *if* the premises are true, the conclusion does not follow necessarily, but merely with a high degree of probability (rather than a probability of 1.0).

### **Section III: Credibility**

Section III involves judging the reliability of supporting statements that are either *fallacious appeals to authority* (possible bias in Item 25) or *legitimate appeals to authority* (the observational testimony of the scientists investigating the toxicity of cabbage worms in ducklings). Fallacious and legitimate appeals to authority are relatively easy to teach to students and these credibility questions are not tricky. Credibility issues *can* be very tricky. For example, beginning students in critical thinking can be very attracted to circumstantial ad hominem reasoning in which they impugn the validity of the speaker's argument because the speaker has a vested interest in the truth of the conclusion. However, speaker bias does not mysteriously affect the logical relationships among statements the speaker produces. Section III questions are not concerned with this fallacy, however, but only with judging the credibility of the testimony of a speaker.

### **Section IV: Induction (Judging Conclusions)**

Section IV is concerned exclusively with whether empirical data support or are contrary to the inductive conclusion. As in Section 1, the conclusion is explicitly identified for the student. Section IV alone represents 25% of the entire CCTT. These questions are very basic and teaching students to determine the mere presence or absence of empirical support is straightforward. These questions do not ask for judgments of relative strength of support. As teachers of inferential statistics well know, that is an entirely different matter that involves technical tools.

### **Section V: Induction (Planning Experiments)**

Section V concerns selecting the best empirical prediction among three choices, based on the experimental hypothesis, "If any duckling eats a cabbage worm, the duckling will die within six hours." These questions are relatively difficult because they involve conditional reasoning. Specifically, the questions involve understanding the difference between necessary and sufficient conditions. This distinction is a common source of bad reasoning in ordinary language. For instance, understanding the difference between "if" and "only if" in English is notoriously difficult for untrained English speakers. Here is a simple example: "Combustion will occur if oxygen is present" versus "Combustion will occur only if oxygen is present." One of these is empirically true and one is false. In the former, the presence of oxygen is asserted to be a sufficient condition for combustion—obviously a false statement. In the latter, the presence of oxygen is asserted to be a necessary condition for combustion—a true statement.

### **Section VI: Definition and Assumption Identification**

Section VI has just four questions concerned with definition ("stock cars" and "dough"). This section seems to be the section most sensitive to reading comprehension, per se. The two examples are very simple, but the student must compare alternative definitions word by word in order to correctly answer the questions. This section will be intuitive to every faculty member for the reason that it focuses on a precise definition of a concept that is central to the speaker/writer's thesis. One would expect a very high correlation in performance on this section and assessment of reading comprehension. Definition is germane to many aspects of critical thinking, e.g., equivocation, so it would be surprising to see dramatically different scores on this section and Section II.

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## Section VII: Assumption Identification

Section VII concerns what is arguably the most difficult aspect of critical thinking: the identification of unstated assumptions or premises. In logic, a piece of reasoning that contains implicit premises or conclusions is called an “enthymeme.” Virtually all reasoning in ordinary language is enthymematic. For example, the argument “John will be cold on the winter hike because he wore a cotton undershirt” has the implicit premise, “Anyone who goes on a winter hike wearing a cotton undershirt will be cold.” An example of reasoning that has an unstated conclusion would be “Who abused Sally is pretty obvious. Her step-father was a victim of sexual abuse as a child, and we know that there is a strong correlation between childhood abuse and being an abuser in adulthood.” Section VII does not test identification of unstated *conclusions*, but only of unstated *assumptions*. In my experience, critical thinking students have considerable difficulty in learning to identify both unstated assumptions and conclusions.

### Conclusion:

At the very outset, critical thinking instruction cannot be adequately covered by the philosophy faculty. English departments have labored long in the critical thinking fields and the close connection between reading, writing, and critical thinking make English and philosophy faculty natural allies in critical thinking instruction. I should point out that I am not assuming that preliterate peoples are not capable of critical thinking. Literacy is arguably not a necessary condition for a high level of critical thinking abilities, and it is clearly not a sufficient condition for a high level of those abilities. Nonetheless, reading with comprehension is such a central concomitant ability in the classroom setting that there is little point in designing a critical thinking curriculum that ignores reading ability. A similar point can be made with respect to writing, and we are well-positioned in this regard because of our WAC program.

It would be a most serious error to imagine that critical thinking instruction is the province of the humanities. Recall that almost *half* of the questions on the CCTT concern reasoning in the sciences. Teaching critical thinking must truly be a campus-wide effort.

This does not mean that all faculty are automatically prepared to participate. Being a talented biologist (or historian) does not mean that the College should place that faculty member into a critical thinking-intensive curriculum without preparation. Faculty development is not just important to the success of a critical thinking component in the undergraduate curriculum—it is essential.

In my view, the question of multiple sections of a single critical thinking course versus an across-the-curriculum approach is largely moot. As Bob Ennis has argued in print, and repeated in his 2003 campus visit, a combined approach has many virtues.

[END OF REPORT]

## Appendix A

### Abilities<sup>14</sup>

Ideal critical thinkers have the ability to

(The first three items involve **elementary clarification**.)

1. Focus on a question
  - a. Identify or formulate a question
  - b. Identify or formulate criteria for judging possible answers
  - c. Keep the situation in mind
2. Analyze arguments
  - a. Identify conclusions
  - b. Identify stated reasons
  - c. Identify unstated reasons
  - d. Identify and handle irrelevance
  - e. See the structure of an argument
  - f. Summarize
3. Ask and answer questions of clarification and/or challenge, such as,
  - a. Why?
  - b. What is your main point?
  - c. What do you mean by...?
  - d. What would be an example?
  - e. What would not be an example (though close to being one)?
  - f. How does that apply to this case (describe a case, which might well appear to be a counter example)?
  - g. What difference does it make?
  - h. What are the facts?
  - i. Is this what you are saying: \_\_\_\_\_?
  - j. Would you say some more about that?

(The next two involve the **basis** for the decision.)

4. Judge the credibility of a source. Major criteria (but not necessary conditions):
  - a. Expertise
  - b. Lack of conflict of interest
  - c. Agreement among sources
  - d. Reputation
  - e. Use of established procedures
  - f. Known risk to reputation
  - g. Ability to give reasons
  - h. Careful habits
5. Observe, and judge observation reports. Major criteria (but not necessary conditions, except for the first):
  - a. Minimal inferring involved
  - b. Short time interval between observation and report
  - c. Report by the observer, rather than someone else (that is, the report is not hearsay)
  - d. Provision of records.
  - e. Corroboration

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<sup>14</sup>Robert H. Ennis, "An Outline of Goals for a Critical Thinking Curriculum and Its Assessment," Champaign, IL: University of Illinois, 2003, <http://faculty.ed.uiuc.edu/rhennis>. Distributed as part of "Critical Thinking at Heidelberg: Some Relevant Documents," *supra*. This list of the 12 constitutive abilities of critical thinking is a revised and renumbered version of the list that appears in "Critical Thinking: A Streamlined Conception," *supra*.

- f. Possibility of corroboration
- g. Good access
- h. Competent employment of technology, if technology is useful
- i. Satisfaction by observer (and reporter, if a different person) of the credibility criteria in Ability # 4 above.

(The next three involve **inference**.)

6. Deduce, and judge deduction
  - a. Class logic
  - b. Conditional logic
  - c. Interpretation of logical terminology in statements, including
    - (1) Negation and double negation
    - (2) Necessary and sufficient condition language
    - (3) Such words as “only”, “if and only if”, “or”, “some”, “unless”, “not both”.
7. Induce, and judge induction
  - a. To generalizations. Broad considerations:
    - (1) Typicality of data, including sampling where appropriate
    - (2) Breadth of coverage
    - (3) Acceptability of evidence
  - b. To explanatory conclusions (including hypotheses)
    - (1) Major types of explanatory conclusions and hypotheses. (An insight: Best-explanation reasoning fits many conclusions in many fields and areas of interest.):
      - (a) Causal claims
      - (b) Claims about the beliefs and attitudes of people
      - (c) Interpretation of authors’ intended meanings
      - (d) Historical claims that certain things happened (including criminal accusations)
      - (e) Reported definitions
      - (f) Claims that some proposition is an unstated reason that the person actually used (a used assumption).
    - (2) Characteristic investigative activities
      - (a) Designing experiments, including planning to control variables
      - (b) Seeking evidence and counterevidence
      - (c) Seeking other possible explanations
    - (3) Best-explanation criteria for judging hypotheses. The reasoning and reasons to accept a hypothesis should satisfy the following six criteria (the first five being ideal necessary conditions, the sixth a very desirable condition):
      - (a) The hypothesis should explain some facts, given reasonable assumptions.
      - (b) The hypothesis should be consistent with known facts, given reasonable assumptions, but it should at least be conceptually testable.
      - (c) Competitive alternative explanations should be inconsistent with facts, given reasonable assumptions.
      - (d) A legitimate effort should have been made to uncover counter-evidence and alternative explanations
      - (e) The evidence on which the hypothesis depends should be acceptable.
      - (f) The hypothesis should be plausible.

Overwhelming satisfaction of these criteria can give us proof beyond a reasonable doubt, but not deductive validity.

A particular caution: If an alternative plausible hypothesis remains, then the original hypothesis should not be endorsed as proven, but might be accepted for limited purposes.

8. Make and judge value judgments: Important factors:
  - a. Background facts

- b. Consequences of accepting or rejecting the judgment
- c. Prima facie application of acceptable principles
- d. Alternatives
- e. Balancing, weighing, deciding

(The next two abilities involve **advanced clarification**.)

- 9. Define terms and judge definitions. Three dimensions are form, strategy, and content.
  - a. Form. Some useful forms are:
    - (1) Synonym
    - (2) Classification
    - (3) Range
    - (4) Equivalent-expression
    - (5) Operational
    - (6) Example and nonexample
  - b. Definitional strategy
    - (1) Acts
      - (a) Report a meaning
      - (b) Stipulate a meaning
      - (c) Express a position on an issue (including “programmatic” and “persuasive” definitions)
    - (2) Identifying and handling equivocation
  - c. Content of the definition.
- 10. Attribute unstated used/needed assumptions (an ability in its own right that also belongs under both clarification and, in a way, inference).

(The next two abilities involve **supposition and integration**.)

- 11. Consider and reason from premises, reasons, assumptions, positions, and other propositions with which they disagree or about which they are in doubt -- without letting the disagreement or doubt interfere with their thinking (“suppositional thinking”).
- 12. Integrate the other abilities and dispositions in making and defending a decision.

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## Appendix B

### COMMON INFORMAL FALLACIES<sup>15</sup>

1. *ad hominem* abusive (all *ad hominem* arguments are species of the genetic fallacy)
2. *ad hominem* circumstantial (charge of bias or vested interest)
3. *ad hominem tu quoque* (usually a charge of hypocrisy, but also can be a species of “two wrongs make a right”)
4. aesthetic fallacy
5. appeal to authority (*ad verecundiam*)
6. appeal to force (*ad baculum*)
7. appeal to ignorance (*ad ignorantiam*)
8. appeal to pity (*ad misericordiam*)
9. appeal to popularity (*ad populum*)
10. appeal to fear (*ad metum*)
11. argument from repetition (*ad nauseum*)
12. begging the question (*petitio principii*)
13. fallacy of equivocation
14. fallacy of accent
15. fallacy of affirming the consequent
16. fallacy of composition
17. fallacy of conversion
18. fallacy of denying the antecedent
19. fallacy of division
20. false dilemma
21. gambler’s fallacy
22. genetic fallacy
23. hasty generalization (fallacy of small sample)
24. irrelevant conclusion (*ignoratio elenchi*, also known as “red herring,” used when specific named fallacy such as *ad hominem* is not involved)
25. sweeping generalization (fallacy of accident)
26. fallacy of false cause (*post hoc ergo propter hoc*)
27. slippery slope fallacy
28. straw man
29. two wrongs make a right

**Quick links on formal and informal fallacies:**

[Wikipedia List of Fallacies](#)

[Free Dictionary \(derived from Wikipedia\)](#)

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<sup>15</sup>Compiled by Daryl Close.