The Role of Reasoning and Persuasion in the Legal Argumentation

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by

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I. INTRODUCTION. The work of a lawyer, as counselor and advocate, involves reasoning and persuasion. Likewise, the work of a judge, in arriving at and articulating decisions, involves analysis and persuasion. This Article examines the logical part of legal reasoning and historically-recognized techniques of persuasion. The Article covers formal logic, informal logic, rhetoric, and selecting and applying legal rules. The principles run from ancient Greece, through the Middle Ages, to today, as do the examples.

An equally important topic is the psychology of forming opinions and making judgments, which impacts both logic and rhetoric. The psychological and neuro-psychological study of reasoning processes is examined briefly in this Article.

Underlined terms appear in the Glossary at the end of the Article. Further explanations and citations to supporting authority are in endnotes.[1] Some endnotes also contain links to follow if you want to explore a topic further.[2] To avoid ambiguity, terms with a special meaning in Logic or Rhetoric are capitalized, to distinguish their special meaning from the meaning accorded those terms in ordinary speech. By convention, writers on Logic put logical Propositions in quotation marks, and put the punctuation required for the surrounding sentence *outside* the quotation marks, so as not to confuse the rules of sentence construction with the logical concepts. That convention is followed in this Article.

II. USEFULNESS OF THE TOPIC. This Article covers descriptions of logical processes and argumentation techniques that span some 2,300 years. The reader might reasonably ask, as to any one or even all of these topics: "What does this have to do with my law practice, or my role as a judge?" After four years of high school, at least four years of college, three years of law school, and a decade or more of working in the legal field, we all have learned how to think logically and how to speak or write in order to persuade. Much of what we know about logic and persuasion was acquired implicitly, as a side-effect of studying or doing something else. Like knowing how to ride a bicycle or how to swim, it is easier to do it than to explain how to do it.[3] This Article has a different perspective. In our jobs we reason and argue; in this Article we explore the ways we reason and argue. Since the human brain has not changed very much for at least the past 40,000 years,[4] many of the insights into the reasoning and argumentation process, achieved a decade, a century, and even two millenia ago, are as valid and applicable today as they were when they were first announced. In this Article these insights are sometimes placed into historical context, which puts a human face on the abstract concepts, gives tribute where it is due, and shows how enduring these insights really are. While many examples are taken from the law, the reader must either

enjoy or excuse periodic digressions into philosophy, science, and history generally, since some of the most interesting examples of logical thinking and rhetorical technique are in those domains.

Understanding the rules of Logic and principles of Rhetoric allows us to approach legal problem-solving and persuasion in a more methodical and consistent way. It allows us to construct good arguments, and identify bad arguments, more effectively. If your purpose is to transmit your thoughts through communication into the minds of listeners, then knowing how people listen and think can help you do this. If your purpose is to win over an audience, then knowing how to reach their feelings will help you do this.

Speaking of Logic, Gottfried Leibniz said: "This language will be the greatest instrument of reason," for "when there are disputes among persons, we can simply say: let us calculate, without further ado, and see who is right."[5] Logic's strength is its weakness, however. Albert Einstein commented: "Logic will get you from A to B. Imagination will take you everywhere." Perhaps later someone will write an article on the role of imagination in the legal process.

In the present discussion, Logic and Rhetoric are considered as they apply to legal reasoning and legal argumentation. Approaches to interpreting case law and interpreting statutes have developed along different lines. Each are discussed separately. The general principles of reasoning and persuasion are discussed.

III. THE IMPORTANCE OF INTUITION. Before we go deeply into Formal Logic and Rhetoric, we should mention the psychological theory that people have two different ways of reasoning, each fundamentally different from the other. This view is called the dual-process theory of reasoning. According to this view, one approach to reasoning and decision-making is based on logic and the other is based on intuition. As stated in a recent psychological paper:

> Traditionally, logical thinking and intuition have been viewed as rival modes of thought. The former is deliberate, achieving accurate and justifiable representations of the world, and the latter is ineffable, producing best-guess answers to problems without any discernable effort."[6]

Dividing man's being into the rational and the emotional goes at least as far back as Aristotle.[7] The modern psychological view that there are two ways of assessing situations can be traced back to William James in 1890. James contrasted analytical deliberation with an experiential-associative type of thinking. Sigmund Freud beginning in 1900. Freud contrasted a conscious and rational approach with an unconscious and associative approach.[8] In 1994, Seymour Epstein developed a theory that the personality consists of two parallel systems, one a nonexperiential information processor that is rational, free of emotion, abstract, and analytical, and the other that is an experiential information processor that is emotionally driven, "encoding experiences in the form of concrete exemplars."[9] Epstein hypothesized that these two approaches developed in evolutionarily-distinct ways, and were adapted to solve different types of problems. He believed that the rational facility developed more recently on the evolutionary scale than the experiential-based one.[10] A more recent theory differentiates *implicit reasoning* from *explicit reasoning*. Implicit reasoning involves the creation of a set of abstractions or inferences without a conscious awareness of the process. These abstractions occur unintentionally and are beyond conscious control. However, these processes

can be developed and strengthened through frequent repetition so that they become "enduring, well defined, and stable through repeated use."[11] In contrast, explicit reasoning involves the use of abstractions and inferences of which the mind is consciously aware, and that are susceptible to conscious control. They can be reliably recalled from memory because they are stored in "working memory."[12] Currently there is a robust interest in the idea that there are two ways of reasoning, one intuitive and the other rational, which in the literature have come to be called "System 1" (fast, intuitive, associative, pragmatic) and "System 2" (slow and rational, using more brain capacity, subject to conscious control). This model of the process of assessing the world (including arguments) suggests that the formal methods of Logic are important in argumentation, but that the less-logical or non-logical components of persuasion that are addressed through Rhetoric are also important in argumentation.

IV. THE COMMON LAW. Since this Article operates against the background of legal reasoning, it begins with that background which is the Common Law. The Common Law has its roots in pre-historic Britain. As a result of successive invasions, the customs of the indigenous people of Britain were intermixed with the practices of the Romans, the Picts, the Saxons, and the Danes, but there was never a formal exchange of one system of laws for another.[13] By the beginning of the Eleventh Century, England had three principal systems of law: the law of the ancient Britons, which prevailed in some midland counties and west toward Wales; the law of the Saxons, in the south and west of England; and Danish law, in the midlands and along the eastern coast of the island.[14] The last Saxon king, Edward the Confessor, extracted from these separate systems a sketchy but uniform law for the entire Kingdom, and so it was when William, Duke of Normandy, established the foothold for his invasion of England, at Hastings in 1066.[15]

At the time of the Norman Conquest, the law of England was a loosely-integrated form of feudalism, based primarily on an hierarchy of mutual obligation between the common man and his local lord, between the local lord and his overlord, and between the overlord and the king. Upon the success of his cross-Channel invasion of England, William the Conqueror replaced the Anglo-Saxon overlords with his military cohorts, while leaving the basic structure of Anglo-Saxon feudalism in place. The pre-existing political structure of Anglo-Saxon England was so decentralized that a succession of Normal kings struggled to impose Norman ways across England with uneven effect. William I brought with him the French language, the Catholic church, and the vestiges of Roman Civil law. But the English common law "weathered the rude shock of the Norman Conquest,"[16] and the foundation of modern English law was thus an amalgam of pre-Norman institutions and France's version of Canon Law and Roman Civil Law. Because England was, as-it-were, on the periphery of the civilized world, even after the Conquest English law developed independently from the law developing on the Continent of Europe. Just like the English language generally, English legal writing reflected a mix of Anglo-Saxon, Latin and French concepts and terms. Additionally, post-Conquest England suffered from a succession of absentee-kings, dethronements, and institutional struggles as the kings consolidated power at the expense of the feudal lords, all of which impaired the development of a uniform, top-down legal infrastructure. To a greater extent than elsewhere in Europe, in England the law accepted by the population developed from the bottom up, based on the rulings of individual judges in specific cases that eventually gained recognition as authoritative statements of the law.

Henry II, in the 1100's, succeeded in making inroads into the legal authority of local lords, by adopting statutes that centralized the English legal system through establishing a "permanent court of professional judges," and by sending "itinerate judges throughout the land," and by establishing new procedures such as writs that allowed the removal of court actions from local courts to royal courts.[17] Henry's efforts centralized the law and made it uniform, and thus "Common" in the sense of shared throughout the realm. However, Henry II's changes were more to the structure of the legal system and not the content of the laws, so that the individual decisions of judges still developed the law incrementally.[18] The common law of England evolved into a mixture of disconnected royal decrees and enactments of Parliament (many merely codifying existing common law principles), court rulings recorded in inaccessible registers, local practices that varied widely, and settled customs developed by people as they went about their daily lives without the benefit of legal oversight. Periodically, a legal thinker would undertake to organize and restate the law, as Sir Thomas Littleton did in 1481, with his three-volume work on real property rights, called *The Tenures* (written in *Law French*),[19] and as Edward Coke later did with his four volumes of *Institutes on the Lawes of England*, published from 1628 to 1644.[20] However, even treatises on the law that were written in English were obtuse, dominated by procedural considerations, and riddled with archaic French and Latin phrases, all of which served as a barrier to the uninitiated. By the Eighteenth Century, the works of earlier jurisprudes like Glanvil,[21] Bracton,[22] and Britton[23] were out-of-date, and efforts to update them had merely engrafted later developments on their outdated conceptual frameworks.[24] The legal writings of Francis Bacon, while insightful, were idiosyncratic and disjointed.[25] Coke's work was rich in detail but lacking in organization.[26] Cowel's *Institutions* was written in Latin and patterned after the wholly dissimilar laws of the Roman Emperor Justinian.[27] Finch's *Discourse of Law* was comprehensive, with valuable examples, but by the mid-1700s had been made obsolete by changes in property law and legal procedure.[28] Another grouping of legal treatises, called "abridgements," contained explanations, or one-sentence digests of case holdings, relating to various legal principles that were listed in alphabetical order, making them useful as reference works for lawyers and judges, and students receiving instruction in the law at one of the London's Inns of Court or Inns of Chancery,[29] but not to other persons interested in the law. None of these works presented a cohesive view of how the parts of contemporary English law fit together into a whole.

All of this changed in 1753, due to William Blackstone, an unsuccessful barrister who had been passed over as a candidate to fill an endowed professorship on civil law at Oxford University, but who had enjoyed successes in various administrative jobs and held a fellowship at All Souls College, Oxford.[30] After seven years of practicing law, Blackstone had concluded that he did not have the gifts necessary to plead cases in court, and that his strength was "the thinking theoretical part" of the law.[31] He resolved to conduct a series of private lectures on English law, directed at University students who intended to become lawyers, as well as to interested members of the public.[32] Blackstone "therefore made it is his first Endeavor, to mark out a Plan of the Laws of ENGLAND, so comprehensive, as that every Title might be reduced under some or other of it's general Heads, which the Student might afterwards pursue to any Degree of Minuteness; and at the same time so contracted, that the Gentleman might with tolerable Application contemplate and understand the Whole."[33] When his preparations were complete, Blackstone advertised that, in four lectures, he

would "lay down a general and comprehensive plan of the Laws of England; to deduce their History; to enforce and illustrate their leading rules and fundamental Principles; and to compare them with the Laws of Nature and other Nations; without entering into practical Niceties, or the minute Distinctions of particular Cases."[34] The registration fee for the four lectures was six guineas.[35]

On June 23, 1753, in the dining hall at All Souls College, Blackstone delivered his first lecture, to great success. As his lectures continued, Blackstone realized--

> That, in a Course of oral Lectures, on a Science entirely new, and sometimes a little abstruse, it was not always easy for his Audience so far to command their Attention, as at once to apprehend both the Method and Matter delivered: And, whenever, through Inattention in the Hearers, or (too frequently) through Obscurity in the Reader, any Point of Importance was forgotten or misunderstood, it became next to impossible to gather up the broken Clue, without having some written Compendium to which they might resort upon Occasion.[36]

Blackstone therefore issued in 1754 a syllabus of his lectures, called *An Analysis of the Laws of England*, which amounted to a taxonomy of English law, drawn heavily from Matthew Hale's *Analysis of the Law* (1713).[37] In 1756, Charles Viner, an Oxford-educated lawyer who had authored a highly successful alphabetically-arranged 23-volume *General Abridgment of Law and Equity*,[38] died and bequeathed £ 12,000 and the copyright to his *Abridgment* to Oxford University, to endow a chair on English Law (the first chair on English law at any English university). In view of the success of his private lectures, Blackstone secured the initial appointment to that Chair on October 20, 1758. Blackstone read his first Vinerian lecture on October 25, 1758, entitled *A Discourse on the Study of the Law*.[39] In this 37-page lecture, Blackstone's stated purpose was to "demonstrate the utility of some general acquaintance with the municipal law of the land, by pointing out its particular uses in all considerable situations of life."[40] He compared the study of law in the university setting favorably to the then-degraded circumstances of the Inns of Court and Inns of Chancery, outlined the benefits "to the science of law itself" that could result from University study, and concluded by stating his intent to follow the outline in his *Analysis of the Laws of England* in presenting a course of study whereby "gentlemen of independent estates and fortune," who did not intend to become lawyers, could acquire a suitable knowledge of the law in a single year.[41]

As his Vinerian lectures continued, and boot-legged versions of his lectures began to circulate and to be illicitly sold for profit, Blackstone compiled his lectures and writings on English law into a four-volume treatise, entitled COMMENTARIES ON THE LAWS OF ENGLAND,[42] that was published from 1765 to 1769. Volume I begins with a description of Blackstone's philosophical perspective on the nature of law in general, drawn heavily (and without attribution) from the writings of the Catholic theologian Thomas Aquinas.[43] Blackstone defined "law" as "a rule of action dictated by some superior being."[44] The physical world is governed by "the law of nature," such as the laws of gravity, optics, and mechanics (expounded by the English Scientist Isaac Newton in the 1600s), that were imposed by the supreme being when he created the universe and set things in motion. When applied to the affairs of man, the law of nature reduces to this: the creator has "so intimately connected, so inseparably interwoven the laws of eternal justice with the happiness of each individual" that one could

not be attained without the other. Blackstone asserted that what tends to man's real happiness is part of the law of nature, and what is destructive of man's real happiness "the law of nature forbids."[45] He continued: "This law of nature, being coeval with mankind, and dictated by God himself, is of course superior in obligation to any other. It is binding over all the globe in all countries, and at all times: no human laws are of any validity, if contrary to this."[46] Blackstone wrote that the limitations of human reason make it difficult to discern how the law of nature is applied to the affairs of man, so the creator assisted in this discovery process by divine revelation, reflected in the holy scriptures. Blackstone asserted that, upon the law of nature and the law of revelation, depend all human laws.[47] From these two sources, he said, derive the law of nations, and the laws of each particular nation.[48]

The law of a particular nation, which Blackstone called "municipal law," is a "rule of civil conduct prescribed by the supreme power in the state."[49] Blackstone subdivided municipal law into constituent parts and prioritized them in a hierarchy from the greatest to the least. He differentiated common law from statutory law. English common law consists of general customs (observed everywhere), particular customs (observed in only parts of England), and particular laws (observed only in certain courts and jurisdictions).[50] To be valid, particular customs must meet seven criteria. They must: originate beyond the memory of man; be continuous; have been acquiesced in; be reasonable; be certain; be compulsory; and be consistent.[51] In passing, Blackstone stated rules of statutory construction[52] and the doctrine of stare decisis,[53] with its exceptions.

Blackstone progressed to a discussion of particular municipal laws of England. He divided these into four categories: two categories of rights and two categories of wrongs. Book I includes the rights of persons, from the King on down to the common man. Book I also discusses the relationships of husband and wife, master-servant, and guardian and ward. Book II discusses the rights in things (property rights), primarily in land but including personal property. Book III discusses private wrongs (torts). Book IV deals with public wrongs (primarily criminal law).

Blackstone's COMMENTARIES were immediately and immensely popular, going through a number of printings in short period. The books sold well in America, too, with the first printing of 1,400 copies in 1771 selling out quickly. After a period of time had passed, American law professors began to publish their own versions of the COMMENTARIES, with annotations and footnotes to the constitutional, statutory, and case law of their states. The first was William & Mary Law Professor St. George Tucker's annotated version, called "Tucker's Blackstone," published in 1803, which reoriented the work from a monarchical to a constitutional government and tied it to the laws of Virginia.[54] THE COMMENTARIES had a profound effect on American law,[55] with Blackstone's concept of natural law as a limit on the power of government finding expression in the Declaration of Independence[56] and the Federalist Papers.[57] The COMMENTARIES were cited in ratification conventions for the U.S. Constitution, as well as in Chief Justice Marshall's Opinion in the landmark case of *Marbury v. Madison*.[58] Blackstone's concept of the balance in governmental power, which for him meant the King versus Parliament versus the courts, found its expression in the checks and balances of the U.S. government, and the division of authority between the federal government and the states. Blackstone's recognition of the writ of habeas corpus[59] and the prohibition against ex post facto laws[60] garnered explicit mention in the U.S.

Constitution. Of course, Blackstone did not invent these concepts himself. But he organized them into a logically-structured whole, and set them out in readable fashion, in a conveniently portable and affordable format. Unlike other intellectual forbears of the American Revolution and government, such as Rousseau, Montesquieu, and Locke, Blackstone merged philosophical principles and legal doctrines into a kind of "applied philosophy of law" that penetrated the thinking of the men who created the post-colonial governments in America.

As the American frontier pushed westward, the COMMENTARIES moved with it, serving as a substitute for large, private law libraries that were non-existent in communities west of the Appalachian Mountains.[61] Because the COMMENTARIES could be read and understood by persons with no background in the law, they became the favorite vehicle for self-study by many Americans aspiring to become lawyers without a university education or a lengthy apprenticeship, ranging from Patrick Henry to Abraham Lincoln.[62]

The view that the common law is a body of principles, that can be discerned with careful analysis, was espoused not only by Blackstone but also by many that followed him. It continues to be the way law is taught, and the way law is applied, through today.

V. LEGAL REASONING (OVERVIEW). Following the paradigm of scientific inquiry developed in the Sixteenth, Seventeenth, and Eighteenth Centuries, it became accepted among legal thinkers in Nineteenth Century America that legal reasoning was governed by an analytical process akin to the formal deductive logic first elucidated by Aristotle, where rules of law were applied to specific facts to arrive at the correct result. As noted above, Blackstone's COMMENTARIES facilitated this approach, by assembling a disparate array of common law principles into a compact and accessible format, which became widely disseminated in the United States as a "body of law." As societal institutions modernized, and a self-sufficient agrarian economy was replaced with an economy based on manufacture, trade, and services, new legal principles had to be developed to accommodate these new activities. Due to the federal nature of the United States of America, with each state being sovereign in its own geographical region, the common law developed in the 19th century in different states at different paces, without the cohesion that would have resulted from a unified legal system.

Beginning in 1870, when Professor Christopher Columbus Langdell introduced the "case method" of study in his Harvard Law School contracts class, the view developed that legal reasoning was more akin to inductive logic, where principles of law could be inductively discerned from analysis of the appellate court decisions of England and of various American states and the principles could then be applied to new cases in a deductive fashion.[63] Prior to Langdell, American authors of legal treatises on, for example, contract law used the "manual method," which grouped cases around particular factual components of situations, such as contracts with inkeepers, as distinguished from contracts with "drunkards, spend thrifts, seamen, aliens, slaves, infants, married women, outlaws," each of which was differentiated from the others.[64] Langdell, in contrast, thought that the "manual method" presented a small number of fundamental legal doctrines under different guises that were no more than confusing repetitions of each other.[65] Langdell suggested: "If these doctrines could be so classified and arranged that each should be found in its proper place, and no where else, they would cease to be formidable from their numbers."[66] Whereas William Story's 1844 treatise on contract law contains seventy-seven divisions and

subdivisions of contract law, Langdell greatly reduced this number, and refocused contract law on basic principles such as offer, acceptance, consideration, and conditional contracts.[67]

The view that the common law consisted of rules that must be understood and applied in an analytical fashion, came to be known as "legal formalism." Legal formalism was condemned by Oliver Wendell Holmes, Jr., in his famous 1897 Harvard Law Review article *The Path of the Law*,[68] which harbingered the change in perception of the legal process from the application of a fixed body of rules (what Holmes called a "brooding omnipresence in the sky")[69] to the process of adapting existing legal principles and inventing new ones in order to keep pace with developing practices in society.[70] In 1906, Nebraska College of Law Professor Roscoe Pound (later Dean of Harvard Law School) spoke out against what he called "mechanical jurisprudence," and argued that rules of law should be evaluated based on the social interests they served.[71] In 1919, Yale law professor Arthur L. Corbin wrote of the changing nature of legal principles.[72] In 1949, Chicago Law Professor Edward Levi, in his book, AN INTRODUCTION TO LEGAL REASONING, rejected the idea that "the legal process is the application of known rules to diverse facts."[73] Instead, he said "[t]he basic pattern of legal reasoning is reasoning by example. It is reasoning from case to case."[74] Professor Levi thus saw legal reasoning to be not deductive reasoning but rather as analogical reasoning. The writings of Justice Holmes, Dean Pound, Professor Corbin, Professor Levi, and others, paralleled the rise of the Legal Realism movement of the first half of the Twentieth Century, which disavowed the view of the law as a system of abstract principles, and suggested that the role of judges was to resolve legal disputes in a manner consistent with contemporary practices and a modern sense of justice. These and other developments resulted in the traditional view that Logic was the central element of legal reasoning being replaced by the view that judicial decisions were nothing more than the exercise of political power.[75] Since under this "modern" view lawyers could make policy arguments to justify departing from precedent, the importance of political considerations, social values, ingenuity, and persuasive techniques in the practice of law was greatly increased. Logic was not abandoned, but it was relegated to the status of one of several tools the lawyer could use to persuade the decision-maker.

In recent times, an analytical method called *Informal Logic* has been proposed as more accurately describing the way people actually go about the reasoning process than the rigid structures of formal Aristotelian logic. This Article discusses the principles of formal and informal logic adapted to legal reasoning.Yet another approach considers legal analysis as a process of determining and applying the appropriate legal rules and exceptions to rules, to resolve a legal dispute. No single approach to legal reasoning can claim to be sufficient, since these models are at best over-simplifications of a complex reality. Human reasoning has more aspects than any one approach can capture.

A. FORMAL LOGIC. *Formal Logic* has been divided into two parts: Deductive Logic and Inductive Logic. To that some writers have added a third: Reasoning by Analogy, although some say that Reasoning by Analogy is just a special instance of Inductive Logic. Also, since the work of Blaise Pascal and Pierre de Fermat in the 1600s, Reasoning with Probabilities has become an important part of Logic.

1. *Deductive Logic*. As expounded by the ancient sage Aristotle, Deductive Logic is a method of using known truths to arrive at absolutely certain conclusions. Aristotle used what is called Syllogisms to frame issues in

the form of formal propositions, where two overlapping Premises necessarily lead to a Conclusion. Judges and lawyers seldom explicitly frame legal issues as Syllogisms. It can be helpful, however, to put the issues of a legal problem into the form of Syllogisms, so that the logical components of the legal problem are more evident and can be more readily evaluated.

In modern times, Deductive Logic is more often expressed in terms of Aristotle's other form of Deductive Logic, involving two ideas linked in a conditional relationship called Implication. In this approach, logical arguments take the form "P implies Q," meaning that an Antecedent "P" is connected to a Consequent "Q" in such a way that if "P" is proven to be true then it necessarily follows that "Q" is true. In addition to this rule of proof, Logic also provides a rule of disproof: if the Implication that "P implies Q" is Valid, then proving that "Q" is false establishes that "P" is false. The foregoing rule of proof and rule of disproof are powerful tools in the reasoning process.

Implications abound in legal reasoning. Sometimes Implications are explicitly stated, as when jury instructions state evidentiary presumptions by which the proof of one fact allows or requires a certain conclusion. Sometimes Implications are implicit, like the sign in a convenience store that says "We Card Everyone," meaning that if you are under 21 years of age then you may not buy alcohol. It can be very helpful to break a legal problem down into its underlying Implications, so that the Antecedents and the Consequents, and the relationships between them, can be evaluated.

2. *Inductive Logic.* It is often said that deductive reasoning moves from the general to the particular, while inductive reasoning moves from the particular to the general. This is usually but not always the case. It is also said that deductive reasoning draws a Conclusion from things that are already known in the Premises, while inductive reasoning draws a Conclusion about something that is not already known from the Premises. Inductive Logic operates by examining multiple occurrences, using creativity or a "hunch" to propose an explanatory or unifying underlying principle stated as a hypothesis, and then subjecting the hypothesis to testing to determine its validity. It is the accepted view that inductive reasoning cannot establish principles with logical certainty, but only with probability, albeit sometimes with a high degree of probability. Since the 1800's, inductive reasoning is often expressed in terms of probability. Some probabilities can be arrived at using probability theory, but others can only be reached by statistical analysis of data. Probability theory and statistical analysis have come to dominate discussions of Inductive Logic. Statistical data on the outcomes of legal disputes is usually not captured, either at the aggregate level or on a court-by-court or judge-by-judge basis, despite the fact that such information would be immensely helpful in predicting outcomes of legal disputes. Statistical analysis has not yet been widely applied to legal decision-making and the extensive work describing inductive reasoning in terms of probability and statistics is not yet readily applied to legal issues. But the fundamental approach of Inductive Logic can be applied to legal reasoning, and it is this aspect of Inductive Logic that is addressed in this Article.

3. *Reasoning With Probabilities*. Reasoning with Probabilities has replaced the old Logic in those areas of concern where the matters being considered cannot be determined with certainty, but can be quantified (i.e., expressed in numbers) and subjected to mathematical processes. Deductive Logic declares that Propositions are either True or False, based on Premises that are either true or false. This

two-valued ("bivalent") Logic did not work with Premises that are partly true and partly false, or Propositions that are sometimes True and sometimes False. If a Premise that is partly true and partly false can be restated in narrower terms, to include only the "trues" and none of the "falses," then the old Logic could still be used. However, in some situations advancing knowledge required that the revised Premise exclude so many exceptions that it lost its utility in supporting Propositions. The same process was applied to Propositions that were sometimes True and sometimes False. If the Proposition could be narrowed in scope to include only certainties, the old Logic could still be used. But there were instances where no amount of narrowing could reach a place where the Proposition was always either True or False. In situations where the Proposition was unavoidably sometimes True and sometimes False, then the old Logic could not be applied. When probability theory was developed in the 1600s, the mathematicians stepped forward to quantify uncertainties, and the logicians followed in the 1800s and 1900s with logical systems that could handle probabilities as well as certainties. This opened Logic up to the potential of deducing probable Conclusions from possible Premises, and gave the methods of reasoning developed under the old Logic a role in a wider ranges of situations, ranging from predicting the most likely position of an electron to predicting the likely choice a person would make in a given situation. Probabilities have their application in law, as when a psychiatrist testifies to the likelihood of future dangerousness in a capital murder case, or when the Supreme Court is evaluating the constitutionality of continued detention of a person convicted of a sexual crime after he has completed the term of his criminal incarceration. In this Article, the basics of Reasoning with Probabilities are discussed, but extensive discussion is left to the mathematically-minded.

4. *Reasoning by Analogy*. Reasoning by Analogy is an analytical process that attempts to associate a new item with a familiar item that has already been classified, or attempts to associate a new problem with a familiar problem that has already been solved. If the similarities between the new and the old are judged sufficient, then the classification or rule used for the old item or problem is applied to the new one. This process is applied whether it is a nuclear physicist considering a new subatomic particle created with a gigantic particle accelerator, or a zoologist classifying a new insect discovered in the rain forest, or an astronomer classifying a new galaxy discovered with a more powerful telescope. Reasoning by Analogy is also used when a legal dispute does not clearly fall under an existing rule of law, so that the judge must compare the new case to various older cases until s/he finds the closest fit, and uses the rule from the old case to resolve the new one. Reasoning by Analogy also occurs when a judge is called upon to interpret a vague or ambiguous statutory provision, which may require her or him to compare the statute in question to other statutes in search of a consistent meaning.

B. INFORMAL LOGIC. Informal Logic started in the 1960s as an effort to make Logic more relevant to the kinds of arguments that occur in ordinary conversation. The goal was to develop a logic that can be applied to everyday reasoning. While the focus is still on establishing premises that lead to a conclusion, there is no requirement (like there is in Deductive Logic) that premises be absolutely true before a sound argument can be made. Informal Logic is willing to accept the possibility that an illogical argument may be a useful starting place on the road toward a better argument. Additionally, since exactness and logical necessity are not a requirement for Informal Logic, people can make acceptable arguments that are based on approximations and likelihoods. Informal Logic finds

examples of acceptable arguments in the media, in political speech, in advertising, and not just in the rigidly-structured hypothetical examples typically used in formal Logic.

C. A RULE-ORIENTED APPROACH. Deductive reasoning, inductive reasoning, and reasoning by analogy, come together in legal reasoning. Legal reasoning can be seen as a logical process in which problems are resolved by (i) determining the correct legal rule to apply, and then (ii) applying that rule to resolve the dispute at hand. The rule-centered approach has two phases, "rule selection" and "rule application."

Rule selection requires the lawyer or judge to discern which of the great welter of legal principles would best be applied to resolve a legal problem. A lawyer's or judge's awareness of these rules could come from law school, or from prior experience, or from research in the particular case, or from the arguments of opposing counsel. Broad knowledge of the law, and broad experience with the law, and good research skills, and creativity, and good advocacy, all play a part in the rule selection process.

The rule-application process is more tightly connected to the facts of the specific case. If the facts are in dispute, then rule-application gets into non-logical considerations like whether a witness's memory is accurate, whether a witness is lying, whether a signature is genuine, and the like. In this domain, human emotions, and the techniques of comedy and drama and entertainment and persuasion, compete with and can even outweigh logic. Where the rule finally applied in the case requires the trial judge to exercise discretion, then even when the law and the facts are determined there is still the issue of how the judge might be persuaded to exercise that discretion. In the realm of rule-application, natural-born persuaders contrast with those who have studied the art of persuasion, and persons who act on intuition contrast with those who act based on their study of human psychology.

Having just neatly divided the legal reasoning process into two phases, it is necessary to say that the process of rule-determination is not really divorced from the process of rule-application. The nature of the dispute and the facts of the case are used to narrow the range of rules that might be selected to resolve the dispute. In some instances, anticipating how a legal rule will affect the outcome of a case can influence or even determine what rule is selected, so that anticipation of the rule-application process becomes part of the rule-selection process. Likewise, anticipating what rule will be applied when a dispute eventually winds up in court can influence how individuals act as the underlying dispute is developing long before the dispute makes its way to a courtroom. In that instance, rule-determination can influence what the facts will be when the rule application process eventually occurs. So in actuality rule-determination and rule-application can be interactive and interdependent. This Article, however, will treat the simpler case where the rule-determination precedes and is not influenced by rule-application.

This rule-oriented approach to legal reasoning is taken up in more detail later in this Article, after formal logic and informal logic have been explored.

In a broad sense, Logic was developed as a way to help people think and speak more effectively. The principles were originally derived from a study of successful reasoning techniques, used in philosophical discourse and persuasive speaking. Thus, from the beginning Logic was tied to the way people communicate, and this tie persists to this day.

D. MODERN ARGUMENT THEORIES. Modern argument theories have recently

developed to describe how arguments are presented in daily life. An important aspect to the new approach is to view arguments as "defeasible," meaning that they are subject to being refuted or abandoned as more data or evidence are received. In this light, defeasible arguments are provisional, and make no claim to conclusive force as does Deductive Logic, or even to the strength of many examples or reliance on statistics and probabilities as in Inductive Logic. Modern argument theory follows the premises-conclusion or antecedent-consequent forms of Logic, but with no guarantees as to the ultimate truth of the Premises or the Conclusion. In this view, an Implication may be seen as a working hypothesis, treated as reliable unless and until something better comes along. The idea of Defeasible Arguments is a useful construct in areas, such as the law, where there are rules of law that have exceptions, and where the applicability of a rule or exception depends on evidence for and against that must be weighed. In such areas, some facts give rise to general rule that is presumptively applied unless and until additional facts give more support to an exception to the rule or to an alternate rule.

VI. FORMAL LOGIC. As Logic was born of the intellectual analysis of the way people communicate, Logic eventually settled on the *form* of the reasoning process, and not the *content* of what was said. Thus, Logic concerns "Valid" and "Invalid" methods of reasoning. Logic emphasizes the relationship between two or more concepts, as opposed to the relationship between concepts and reality (which would be philosophy or science), or the relationship between concepts and audiences (which would be rhetoric or the arts.)[76]

This Article focuses on Propositional Logic, which is a system for using Logic Operators to connect Statements together into logical Propositions, and to connect simple Propositions together into more complex Propositions, and to construct logical proofs using the tools of Logic Argument. Propositional Logic approximates the way people talk and reason about matters that arise in daily lives and business.

A. ARISTOTLE. Aristotle of Stagira, Macedonia, lived from 384 B.C. to 322 B.C. His writings are the earliest comprehensive study of Logic that has survived to today, perhaps because--as Aristotle himself claimed--his were the first descriptive writings on the subject. Aristotle was a student of the philosopher Plato and a tutor of the conqueror Alexander the Great of Macedonia. Aristotle wrote on most subjects of interest to the ancient mind. Aristotle's writing on Logic appear in six different books: CATEGORIES, ON INTERPRETATION, PRIOR ANALYTICS, POSTERIOR ANALYTICS, TOPICS, and ON SOPHISTICAL REFUTATIONS, collectively called THE ORGANON. Thinkers and writers of western Europe's Middle Ages seized on Aristotle's works as a foundation for their analysis of Logic, and Aristotle's ideas have remained foundational in the study of Logic. Aristotle's writing on Logic emphasized deductive reasoning (sullogismos), but in his writings on science Aristotle discussed inductive reasoning (epagôgê). Aristotle characterized the two types of Logic in this way:

> All instruction given or received by way of argument proceeds from pre-existent knowledge. This becomes evident upon a survey of all the species of such instruction. The mathematical sciences and all other speculative disciplines are acquired in this way, and so are the two forms of dialectical reasoning, syllogistic and inductive; for each of these latter make use of old knowledge to impart new, the syllogism assuming an audience that accepts its premisses, induction exhibiting the universal as implicit in the clearly known particular. Again, the

> persuasion exerted by rhetorical arguments is in principle the same, since they use either example, a kind of induction, or enthymeme, a form of syllogism.[77]

Aristotle thus ties together Deductive Logic, Inductive Logic, and Rhetoric. These three topics are examined in this Article.

B. STATEMENTS, PROPOSITIONS, AND ARGUMENTS. Some of the terms used in Logic are words that have meanings in ordinary usage, but also have special meanings in Logic that are different from the ordinary meanings of the same words. This is true for the terms "Statement," "Proposition," and "Argument" which are used throughout this Article. This Article adopts a special convention for the use of these terms. In this Article, the word "Statement" is used to describe a sentence, or part of a sentence, that is used in a logical Proposition and can be said to be true or false, measured against the real world. The word "Proposition" refers to: (i) a Statement that has been subjected to a Logic operation; (ii) two or more Statements that have been logically linked using a Logic Operator; or (iii) two or more logical Propositions that have been linked using one or more Logic Operators into a Compound Proposition (i.e., a Proposition consisting of simpler Propositions). The word "Argument" refers to a series of Statements or Propositions that have been linked together to prove or disprove a contention in accordance with the rules of Logic.

Example: "A", "B", and "C" are individual Statements, each of which can be true or false (with reference to the real world). "A And B" is an example of a Proposition, where two Statements are logically connected by the Logic Operator "And". The Proposition "A And B" is logically "True" or "False" depending on the individual truth or falsity of "A" and of "B". "A and B together imply C" is an example of a compound Proposition, where two Statements, that have been joined together in a Conjunctive Proposition (to wit: "A And B"), are logically linked to another Statement in a more complex Proposition called an Implication. Here the resulting compound Proposition is that, "if A is true and B is true, then C must be true." An example of an Argument would be a series of Logic steps that demonstrate that, if "A" and "B" imply "C", and if "C" is false, then either "A" is false or "B" is false, or both are false.

C. TRUTH, VALIDITY, AND SOUNDNESS. In Logic, we deal with truth/Truth (in both a factual and a Logic sense), Validity, and Soundness.

1. True and False. Propositional Logic, which is the focus of this Article, is "bivalent," meaning that Statements, Propositions, and Arguments, must either be factually true (or logically True) or factually false (or logically False), not both and not neither. This is a consequence of Aristotle's Law of Excluded Middle, discussed in Section VIII.A.5. Logic systems that are not bivalent have been devised that avoid some problems that arise from bivalence, but they do not easily correlate to normal speech and are not covered in this Article.

When the terms "true" and "false" are applied to Statements, they mean that the Statement accurately reflects the real world, or it does not. When the terms "True" and "False" are applied to a Logic Proposition or Logic Argument, they (confusingly) mean that the Proposition or Argument is "logically True" or "logically False," according to the rules of Logic (which may differ from the way that the real world operates). To avoid confusion between the real world "true and false" and Logic's "True and False," when "true" and "false" are used in the ordinary sense (i.e., accurate in reality or not), they are in lower

case, and when they are used in the Logic sense they are capitalized.

The Proposition that “All A is B” is True if and only if every “A” is a “B”. Otherwise it is False. The Proposition that "some A is B" is True if and only if at least one “A” is a “B”. The former Proposition (“All A is B”) can be refuted by finding a single counter-example of an “A” that is not a “B”. The latter Proposition (“Some A is B”) can be refuted only by considering every possible instance of “A” and “B”, if that is even possible. Viewed from the standpoint of making a persuasive argument, the former type of Proposition (“all”) is easier to refute than the latter (“some”), and should be avoided if “some” will suffice.

2. Valid and Invalid. Propositions and Arguments can be Valid or Invalid. All Propositions and Arguments start with a Premise, or several Premises, and pass through one or more reasoned steps that conform to the rules of Logic, to reach a Conclusion. A Proposition or Argument is Valid only if, in every conceivable instance, when the Premise is true the Conclusion is true. It therefore follows that, if there is a single instance where the Premise is true and the Conclusion is false, then the Proposition or Argument is logically Invalid. Thus, if a Proposition asserts “if P then Q", the Proposition is Valid if and only if every time “P” is true “Q” is also true. (This bivalent approach does not apply when the connection between “P” and “Q” is only probable; accordingly, probable relationships are discussed separately, later in this Article).

3. Sound and Unsound. Propositions and Arguments can be Sound or Unsound. A Proposition or Argument is Sound when (i) it is logically Valid, and (ii) the Premise (or Antecedent) is true. If a Proposition or Argument contains a Premise that is false (i.e., pigs have wings), then the Proposition or Argument is Unsound and the truth of its Conclusion is not certain. A Proposition or Argument can be logically Valid even when it is Unsound. This is because Logic is an internally-consistent system of principles and rules that requires certain Statements to relate to other statements in particular ways. While logical relationships often agree with our conception of reality, accord with reality is not required for Logic to work, and sometimes the principles of Logic lead to Conclusions that are not in accord with reality. Thus, to some extent Logic is independent from the real world. This may seem like a deficiency, but this also allows us to use Logic to distinguish good from bad reasoning, even when we are not certain of the truth of the Premise (or Antecedent).

4. Application to Statements, Propositions, and Arguments. A Statement is an assertion about the way the world is or is not, or the way it might be, or the way it might have been. A Statement is true if it accurately reflects reality, and false if it does not.[78]

A simple Proposition is logically True or False, depending on the truth or falsity of the Statements contained in the Proposition.[79] A Compound Proposition is True or False, depending on the Truth or Falsity of the simple Propositions contained in the Compound Proposition.

An Argument is Valid or Invalid, depending whether each step of the Argument complies with the principles and rules of Logic. Deductive and Inductive reasoning often proceed from one or more Premises, through a series of logical steps, to a Conclusion. This reasoning process is said to be Valid if and only if, in every conceivable circumstance, when the Premises are true, the Conclusion is also true. If there is a single instance where the Premises are true and the Conclusion is false, then the reasoning process is Invalid.

The reasoning process is said to be Sound if it is logically Valid and all of its Premises are true. Although in real life disputes are sometimes won with an argument that is Invalid or Unsound, having the ability to make an argument that is Valid and Sound, or spot an argument that is Invalid or Unsound, can be an advantage in some situations.

Here is an example of a Proposition, containing two Premises and a Conclusion, that is both Valid and Sound: "Four-legged animals can walk; pigs have four legs; therefore, pigs can walk". The Proposition is Valid because, in all instances, when the two Premises are true the Conclusion is true. The Proposition is Sound because its two Premises are true. If one or more of the Premises of a Valid Proposition are false, then the Proposition is Unsound. Here is an example of a Proposition that is Valid but Unsound: "Creatures with wings can fly; pigs have wings; therefore, pigs can fly". This Proposition is Valid, but it is also Unsound, because the second Premise is false (pigs don't have wings).[80] If someone were to make the same statement in normal conversation, it would likely be a conditional statement in the subjunctive mood[81]: "if pigs had wings, they could fly," or stated more formally, "if pigs were to have wings, then they would be able to fly." In normal English speech and writing, a conditional statement and the subjunctive mood are typically used when the speaker knows that the Antecedent is false, or is unsure of the truth of the Antecedent, or wishes to defer an assessment of the truth of the Antecedent until after the Argument has been completed. The issue of Validity and Soundness becomes more complex when the Proposition involves Premises that are known to be untrue, as when a person speculates on how history might have been different if something that did happen had not, or if something that did not happen had happened. Example: "if Napoleon had not invaded Russia, he would have died the Emperor of France." See Section VII.C.14.c.

Whether a Proposition is Sound or Unsound depends upon whether the *Premises* are true or false, *not* upon whether the *Conclusion* is true or false. An Invalid Proposition can have a Conclusion that is true, just as an Unsound Proposition can have a Conclusion that is true. When it comes to the truth of Conclusions, Deductive Logic only guarantees that Valid Propositions with true Premises have true Conclusions, nothing more. Many logical Propositions simply assume that the Premise is true, and concern themselves with the Conclusion that follows from that assumption. Thus, logical analysis can be applied to Premises whose truth is unknown. Where a Proposition is logically Valid, if an assumed Premise leads to a Conclusion that we know to be false, then Logic says that the Premise must be false.[82] If we change the focus of this reasoning process from a Conclusion that is *false* to a Conclusion that is *undesirable*, then we have a rule of reason that guides our daily lives: if we don't want a certain result, then we avoid the action that leads to that result.

VII. DEDUCTIVE LOGIC. Deductive Logic is a system of reasoning or argumentation, in which rules of Logic are used to show that the truth of one thing (called "the Premise" or "the Antecedent") establishes the truth of another thing (called "the Conclusion" or "the Consequent"). Deductive Logic Propositions can be declarative or conditional. A declarative Proposition arrives at a Conclusion based on two (or more) Premises that are asserted to be true. Example: "the fact that grass is green indicates that grass contains chlorophyll". The two Premises in this Proposition (one explicit and one implicit) are that (i) "green plants contain chlorophyll" and that (ii) "grass is green". A Conditional Proposition takes the form: "if a certain thing is true, then something else necessarily follows."

Example: "If you shout 'fire' in a crowded theater, then you will start a stampede for the exits and people will be hurt."[83]

In Aristotle's own words, translated into English:

> A deduction is speech (logos) in which, certain things having been supposed, something different from those supposed results of necessity because of their being so.

PRIOR ANALYTICS, I.2 246 18-20. This formulation has become the essence of Deductive Logic. Aristotle's "thing supposed" is today called "the Premise" (or "Antecedent" in a Conditional Statement) and what results of necessity is called "the Conclusion" (or "Consequent" in a Conditional Statement).

A. DEFINING CONCEPTS ESSENTIAL TO ARISTOTLE'S DEDUCTIVE LOGIC.

1. Statements. In Aristotle's view, Deductive Logic is composed of Statements, in the form of declarative sentences with a subject and a predicate, where the subject either affirms or denies what is stated in the predicate. For Aristotle, each Statement relates a single subject to a single predicate. Accordingly, unlike modern logicians, Aristotle did not see Logical Conjunction ("A *And* B") or Logical Disjunction ("A *Or* B") as logical Propositions.[84] In a Statement, the grammatical subject and predicate each contain a "Term." A Term can be either "Particular" or "Universal." A particular Term is a specific person, like the philosopher Socrates, or a particular animal, like Bucephalus (Alexander the Great's horse), or a particular thing, like the Parthenon. A Universal term is an abstraction like "man," or "horse," or "temple." To Aristotle, the subject of a Statement can be either Particular or Universal, but the predicate can only be Universal.[85]

2. Affirmation, Denial, and Contradiction. An affirmation asserts that something is true. Aristotle believed that every affirmation corresponds to one denial, where the denial denies what the affirmation affirms. An affirmation that is logically paired with its corresponding denial constitutes a "Contradiction." To Aristotle, one member of a Contradiction is true and the other is false. Example: to say that a particular thing is both "A" and "not-A" is a Contradiction. To Aristotle, either "A" is true and "not-A" is false, or else "A" is false and "not-A" is true. "A" and "not-A" cannot both be true or both be false. In this context, "A" and "not-A" are said to be "mutually exclusive." See the Law of Contradiction, discussed in Section VIII.A.5.

3. All; None; and Some. The Quantifiers "All," "None," and "Some" play an important part in Aristotle's logic, and even more so in the version of modern formal Logic that arose from the writings of Gottlob Frege in the late Nineteenth Century. You can assert that "all A is B," or "no A is B," or "some A is B," or "some A is not B". The Propositions "All A is B" and "no A is B" are Universal assertions, and these two Universals are Contradictory. "Some A is B" is a Particular assertion which is Contradictory to the universal assertion "No A is B". Where the subject of an assertion is Universal (all A is B), it can be denied Universally (no A is B) or in the Particular (some A is not B). These concepts are discussed in greater detail in Section VII.B.8, relating to the Rules of Opposition.

4. Principles, Rules, and Symbols. Just as mathematics has principles, rules, and symbols, that allow us to make calculations easily with confidence in the result, so Logic has principles and rules and symbols that allow us to reason easily and with confidence

that the Conclusions we draw from our Premises are correct. However, in many instances natural language sentences occurring in normal conversation or in legal arguments are not stated in strictly logical terms. Sometimes an illogical argument is obviously illogical on its face. At other times it is necessary to translate a natural language statement or argument into the structure and language of Logic in order to more easily see how the principles and rules of Logic can be applied. The most efficient way to convert natural language arguments into Logic is by substituting variables (such as A, B, C, P, Q, etc.) for the assertions in a natural language argument, and substituting Logic symbols for the verbal connections between assertions, and then organizing the natural language argument into one or more of the forms of Logic Argument that are familiar and whose properties are well-known. This process of translation makes it much easier to tell whether the natural language argument is Valid and Sound.

5. Three Fundamental Principles of Logic. Aristotle suggested three fundamental principles of Logic (also known as "Rules of Thought"): the Law of Identity; the Law of Contradiction; and the Law of the Excluded Middle.

The Law of Identity provides that a thing is the same as itself. This can be stated: "A is A".[86]

The Law of Contradiction provides that a thing cannot be both itself and not itself. Aristotle said: "it will not be possible to be and not to be the same thing."[87] Stated differently, a thing cannot be both "A" and "not-A" at the same moment.[88] Aristotle stated it three ways: (i) "It is impossible that the same thing belong and not belong to the same thing at the same time and in the same respect;" "no one can believe that the same thing can (at the same time) be and not be;" and "the most certain of all basic principles is that contradictory propositions are not true simultaneously." It has been said that, in Western Philosophy, the principle of non-contradiction is deemed essential to all thought, as it asserts the incompatibility between truth and falsity, which is the basis for all intellectual distinctions about the world.

The Law of the Excluded Middle, provides that something is either one kind of thing or it is not that kind of thing--there is no third alternative. Stated differently, something is either "A" or it is "not-A".[89] Leibniz wrote it: "Every judgment is either true or false." The excluded middle drives the process of categorization, where a category is mentally constructed and things are deemed to be either inside or outside of the category.

B. THE SYLLOGISM.[90] Aristotle's structure for Deductive Logic, which later came to be called the Syllogism, consists of two Statements, called "Premises," which lead by logical necessity to a third Statement, called the "Conclusion." Since Aristotle's approach to organizing his thoughts about the world was to put things into categories, his Syllogisms involved including things in, or excluding them from, categories. This form of Syllogism is therefore called the "Categorical Syllogism."

There are four forms of Syllogism: (i) the simple Syllogism; (ii) the Hypothetical Syllogism; (iii) the Disjunctive Syllogism; and (iv) the Dilemma.

1. The Simple Syllogism. The form of Syllogism that Aristotle discussed in his book ON INTERPRETATION is made up of declarative sentences, where the Term (which may be Particular or Universal) expressed in the subject of each sentence is included in or excluded from the Universal category expressed in the predicate of that sentence.

The Term presented in the subject of a declarative sentence is connected by "is" or "is not" to the Term in the predicate of the sentence. The classic example of this form of Syllogism, coined in the Middle Ages and used ever since, is:

> All men are mortal.
> Socrates is a man.
> Therefore, Socrates is mortal.

In the foregoing example, the first sentence is the "Major Premise;" the second sentence is the "Minor Premise;" and the third sentence is the "Conclusion." This 1-2-3 sequence is called the "Standard Order." The order of the sentences can be switched around without affecting the Validity of the Syllogism. The structure of the Syllogism works like this: the Major Premise presents general categories, general alternatives, or general conditions, while the Minor Premise addresses a particular instance of the Major Premise. If the Major and Minor Premises are true, then the Conclusion necessarily follows.[91] Conversely, if the Conclusion is false, then either the Major Premise or the Minor Premise, or both, are false.[92]

The rules of Syllogism require that the Major Premise and Conclusion share a common Term, called the "Major Term," in the foregoing example "mortal." Likewise, the Minor Premise and the Conclusion must share a Term, called the "Minor Term," in the foregoing example "Socrates." The Major Premise and Minor Premise must share a Term that does not appear in the Conclusion. This Term is called the "Middle Term," in the foregoing example "men/man." The Middle Term is what links the Minor Premise to the Major Premise. Unless the Major Premise and the Minor Premise are linked by the Middle Term, the deductive nature of the Syllogism fails, and the Conclusion does not deductively follow from the two Premises.

The Socrates example includes the Particular Term (Socrates) in a Universal category (men), which in turn is included in a Universal category (mortal). One could say that the individual "Socrates" belongs to the category of "men," and the category of "men" belongs to the category of "mortal"; therefore, Socrates belongs to the category of "mortal". The following Syllogism excludes the Particular from a Universal category:

All mammals have hair.
This specimen has no hair.
Therefore, the specimen is not a mammal.

The following is a Syllogism, with parts identified (this Syllogism includes a Particular in one of two mutually exclusive Universal categories, which results in the Particular being excluded from the other Universal Category):

Major Premise: Cats are not dogs.
Minor Premise: Felix is a cat.
Conclusion: Therefore, Felix is not a dog.

The Major Term is "dog." The Minor Term is "Felix." The Middle Term is "cat." The Major Premise could have been stated "No cats are dogs" without changing the Conclusion.

Here is another Syllogism:

> All swans are white.
> This bird is black.
> Therefore, this bird is not a swan.

The Middle Term is "white" (where "black" is taken to mean "not white"). This "swan" Syllogism is logically Valid, but it was proved to be Unsound (for Western Europeans) in 1679, when a Dutch explorer found black swans on the Swan River in Australia. This discovery disproved the Major Premise of the Syllogism. After the discovery of black swans, the Syllogism was Unsound, but it was nonetheless still logically Valid. The

Syllogism could be thought of as Conditional: "if all swans are white, then this black bird is not a swan". The Dutch explorer disproved the Antecedent of the Conditional Proposition, but he did not prove the Conditional Proposition to be logically Invalid. The term "black swan" has now come to signify a situation once believed to be impossible, that nevertheless has actually occurred. After the discovery in Australia, the Conditional Proposition had to be restated: "Since most swans are white, this black bird is probably not a swan".

The following Syllogism is logically Valid, even though the Major and Minor Premises are untrue:

Unicorns have four legs.
This animal is a unicorn.
Therefore, this animal has four legs.

Because at least one (in this case, both) of the Premises is false, the foregoing Syllogism is Unsound.

Here are more examples of Syllogisms:

Toyotas are not safe to drive.
This car is a Toyota.
Therefore, this car is not safe to drive.

2 x 2 = 4.
2 x 4 = 8.
Therefore, 2 x (2 x 2) = 8.

In the foregoing Syllogism; the Major Term is "2 x 2;" the Minor Term is "8", and the Middle Term is "4". More examples of Syllogisms:

A is to the left of B.
B is to the left of C.
Therefore, A is to the left of C.

Paris is not in England.
Jean is in Paris.
Therefore, Jean is not in England.

Take the following Syllogism:

Presidents must be born in the USA.
Barak Hussein Obama is President.
Therefore, Obama was born in the USA.

The foregoing Syllogism is logically Valid and Sound, but whether the Conclusion is true is a matter of controversy.[93] See "Begging the Question" discussed in Section VII.K.6.

The following Syllogism is invalid:

Toyotas are not safe to drive.
This car is a Ford Explorer.
Therefore, this car is safe to drive.

The Major Term is "safe to drive," which appears in the Major Premise (in negative form) and appears in the Conclusion (in affirmative form). The Minor Term is "this car", which appears in the Minor Premise and the Conclusion. The Middle Term is . . . there is no Middle Term, because the Middle Term must appear in the Major Premise and Minor Premise but not in the Conclusion. What should be the Middle Term is "Toyotas" in the Major Premise and "Ford Explorer" in the Minor Premise, but since the terms are not the same, there is no Middle Term that connects the two Premises, so the Syllogism is Invalid. See the "Fallacy of Four Terms," discussed in Section VII.B.10.a. The fact that the Syllogism has failed does not tell us whether the Conclusion is true or false. As you may have heard, some juries have found that Ford Explorers are not safe to drive, at least with Firestone tires. If these juries are right, then the Conclusion is true--not because of the failed Syllogism, but rather because of external fact.

Here is another invalid Syllogism:

Things that honk are cars.

This goose honks.
Therefore, this goose is a car.

Although, the foregoing Syllogism appears to have the word "honk" as a Middle Term, in actuality it does not. Although the Major Premise and the Minor Premise both use the same word "honk," they use the same word in different senses (i.e., a car's honk and a goose's honk are different kinds of honks). The foregoing Syllogism is another example of the Fallacy of Four Terms. See Section VII.B.10.a. The Fallacy arises because of Ambiguity, which occurs when a word or phrase has two or more meanings. See Section XV.2. When a person uses the Middle Term in one sense in the Major Premise and another sense in the Minor Premise of a syllogistic argument, this use of Ambiguity is called "Equivocation." See Section XV.22.

Another Invalid Syllogism:

All Country and Western singers wear cowboy hats.
That fella is wearing a cowboy hat.
Therefore, that fella is a Country and Western singer.

This is Invalid reasoning. Cattle ranchers also wear cowboy hats, and that fella could be a cattle rancher who can't sing. This is an example of the "Fallacy of the Undistributed Middle Term." See Section VII.B.10.b. Here is another example that reflects the Fallacy of the Undistributed Middle Term:

All kangaroos are marsupials.
This animal is a marsupial.
Therefore, this animal is a kangaroo.

This is Invalid reasoning. Wombats are also marsupials, and the animal in question could be a wombat and not a kangaroo.

As noted before, the primary focus of Logic is on the relationship between the Premise and the Conclusion, and only incidentally on the truth of the Premise or the Conclusion. Giving examples of Syllogisms that use real world concepts makes it unfortunately too easy to confuse the Validity of a Syllogism with the truth of the Statements made in the Syllogism. To avoid this problem, Aristotle substituted symbols for words, and thereby introduced to the world the concept of "variables," which one writer called Aristotle's most enduring contribution to the history of thought. Using variables, a simple categorical Syllogism is expressed: "All A is B; all B is C; therefore, all A is C". Discussing logical Propositions using variables allows the reader to look past the truth of the statements in examples and to focus instead on the logical relationships between the Statements.

In PRIOR ANALYTICS, Aristotle identified three types of syllogistic Propositions: (i) A belongs to B; (ii) A is predicated of B; and (iii) A is said of B.[94] "A belongs to B" when A is an item that fits within the category B. "A is predicated of B" when A appears in the predicate of a sentence in which B is the subject. "A is said of B" when A and B are subcategories of a larger category, but subcategory B is smaller and belongs to subcategory A.[95] There are many other complexities to Aristotle's explanation of Syllogisms which interested readers may wish to explore.

2. Polysyllogism. Deductive reasoning can involve one Syllogism, or a series of linked Syllogisms. A series of linked Syllogisms is called a Polysyllogism. In a Polysyllogism, the Conclusion of the preceding Syllogism is the Major Premise of the next Syllogism. Example:

(1) All A is B.
(2) All B is C.
(3) Therefore, all A is C.
(4) All A is C.
(5) All C is D.

(6) Therefore, all A is D.

3. Enthymeme. In speaking or writing, people often state arguments in the form of a Syllogism, while omitting one of the two Premises, or the Conclusion. Such an incomplete Syllogism is called an "Enthymeme". Example:

1. All arguments missing a premise are enthymemes.
2. Therefore, this argument is an enthymeme.[96]

In the foregoing example, the Major Premise and the Conclusion are there, but the Minor Premise is missing.

Since an Enthymeme can be a Syllogism that is missing either the Major Premise, the Minor Premise, or the Conclusion, to see the logic of such an Enthymeme it is sometimes necessary to "expand" the Enthymeme into a Syllogism by supplying the missing part(s). Expanding the Enthymeme allows the Proposition to be more easily evaluated using the rules of Syllogisms. This can be an important exercise because, when one of the parts of a Syllogism is implicit, the asserted Proposition is more readily assumed to be Valid when it is not, or the possibility that a Conclusion is Unsound is more likely to be overlooked. Rules for expanding Enthymemes are discussed in Section VII.B.11.

Enthymemes have another feature that distinguishes them from Syllogisms: Enthymemes do not have to arrive at Conclusions that are certain; they may arrive at Conclusions that are possible or probable. A Logic Proposition that has a Major Premise, Minor Premise, and Conclusion, but the Conclusion is only possible or probable rather than certain, is an Enthymeme.

Aristotle wrote that Enthymemes are frequently used in public speaking, and he covered the topic in detail in his book on RHETORIC. See Section XIV.C.2. Many believe that Aristotle used the word Enthymemes differently in the RHETORIC than in his writings on Logic.

4. Sorites. A SORITES is a chain of incomplete syllogisms in which the predicate of each Premise forms the subject of the next until the end, when the Conclusion is linked to the subject of the first Premise. A Sorites omits all Conclusions except for the last one.

An example:

> For want of a nail the shoe was lost.
> For want of a shoe the horse was lost.
> For want of a horse the rider was lost.
> For want of a rider the battle was lost.
> For want of a battle the kingdom was lost.
> And all for the want of a horseshoe nail.

Sorites are of two types: ARISTOTELIAN SORITES and GLOCLENIAN SORITIES. In an Aristotelian Sorites, the first Proposition is the Minor Premise of its Syllogism and the remaining Propositions are Major Premises which lead to the Conclusion. In a Gloclenian Sorities, the first Proposition is the Major Premise of its Syllogism and the rest of the Propositions are Minor Premises which lead to the Conclusion.

Example of Aristotelian Sorites:

> A is B
> All B is C
> All C is D
> Therefore, A is D.

Example of a Gloclenian Sorites:

> All A is B
> B is C
> C is D
> Therefore, A is D.

Another example of a Sorites:

> Julius Caesar was a great conqueror.
> Through conquest, Caesar acquired wealth and glory.
> Caesar's wealth and glory increased his popularity.
> Caesar's popularity increased his political power.
> Caesar's increased political power threatened the aristocracy.
> Therefore, aristocrats killed Caesar.

Charles L. Dodgson (a/k/a Lewis Carroll, of ALICE IN WONDERLAND fame) was a logician.[97] In 1896, Dodgson developed a system to determine the validity of highly complicated arguments that take the form of Sorites.[98] He listed some playful examples of Sorites with the Conclusions omitted, a few of which are set out below. In case you want to play along with Lewis Carroll, the Conclusion for each Sorites is contained in an end note.

(1) Babies are illogical;
(2) Nobody is despised who can manage a crocodile;
(3) Illogical persons are despised.[99]

(1) My saucepans are the only things I have that are made of tin;
(2) I find all your presents very useful;
(3) None of my saucepans are of the slightest use.[100]

(1) No potatoes of mine, that are new, have been boiled;
(2) All my potatoes in this dish are fit to eat;
(3) No unboiled potatoes of mine are fit to eat.[101]

(1) Every one who is sane can do Logic;
(2) No lunatics are fit to serve on a jury;
(3) None of your sons can do Logic.[102]

(1) No birds, except ostriches, are 9 feet high;
(2) There are no birds in this aviary that belong to any one but me;
(3) No ostrich lives on mince-pies;
(4) I have no birds less than 9 feet high.[103]

(1) When I work a Logic-example without grumbling, you may be sure it is one that I can understand;
(2) These Sorites are not arranged in regular order, like the examples I am used to;
(3) No easy example ever makes my head ache;
(4) I can't understand examples that are not arranged in regular order, like those I am used to;
(5) I never grumble at an example, unless it gives me a headache.[104]

(1) Every idea of mine, that cannot be expressed as a Syllogism, is really ridiculous;
(2) None of my ideas about Bath-buns are worth writing down;
(3) No idea of mine, that fails to come true, can be expressed as a Syllogism;
(4) I never have any really ridiculous idea, that I do not at once refer to my solicitor;
(5) My dreams are all about Bath-buns;
(6) I never refer any idea of mine to my solicitor, unless it is worth writing down.[105]

5. When Premises are Inconsistent. In Formal Logic, a Proposition, with one or more Premises leading to a Conclusion, is Valid if and only if there is no possible situation in which all Premises are true and the Conclusion is false. Where two or more of the Premises of an Argument are inconsistent, it is impossible for all of the Premises to be true. An Argument with inconsistent Premises can never be Invalid because there are no situations in which all of the Premises are true and the Conclusion is false.

Example: "All A is B; no A is B; therefore, the Tower of Piza does not lean". This

Proposition is logically Valid, because the two Premises are a Contradiction, meaning that there is no instance in which all of the Premises are true and the Conclusion false. This example demonstrates a larger principle: a Proposition with inconsistent Premises is always logically Valid, no matter what the Conclusion may be. Thus, inconsistent Premises validly imply all Conclusions, or stated differently: anything can be inferred from a Contradiction. This situation is called the "Principle of Explosion." When Premises are contradictory (meaning that one of the Premises must be false so that the proposition by necessity is Unsound), the rules of Logic validate Conclusions that do not help us to understand the world. Unsound Propositions do not tell us whether the Conclusion is true or false.

6. The Hypothetical Syllogism. In an Hypothetical Syllogism, the first Premise presents a choice which must be resolved by the second Premise in order to reach the Conclusion. There are three kinds of Hypothetical Syllogisms: Conditional; Conjunctive; and Disjunctive.

a. The Conditional Syllogism. A Conditional Syllogism takes the form: "if P implies Q and Q implies R, then P implies R".

b. The Conjunctive Syllogism. A Conjunctive Syllogism contains a compound Major Premise in the form of a Conjunctive Proposition that is denied. The Minor Premise of the Syllogism then either affirms or denies one of the conjunctive terms. Example:

> A and Not-A cannot both be true.
> Not-A is true.
> Therefore, A must be false.

c. The Disjunctive Syllogism. The Major Premise of a Disjunctive Syllogism presents two or more alternatives from which to choose, only one of which can be true. (This is the Exclusive Disjunctive, discussed in Section VII.F.3). The Minor Premise then either chooses one of the alternatives, or rejects all alternatives except one. Example:

A or B.		A or B.
A.	or	B.
Therefore, not-B.		Therefore, not-A.

In the foregoing example, "A" and "B" must be mutually exclusive or the Disjunctive Syllogism is Unsound (i.e., it has a false Premise). Another example:

> A or B or C or D.
> Not-A.
> Not-B.
> Not-C.
> Therefore, D.

The foregoing example shows proof by "process of elimination." Another example:

> Either it is night or it is day.
> It is not night.
> Therefore, it is day.[106]

The foregoing Syllogism raises the problem of gradations (i.e., when does night become day?) See Section XIX.

Enthymemes may be disjunctive.

7. Quantifiers and Distribution. Quantifiers are Logic Operators that signify quantity, or degree, or extent, in connection with categorical Propositions. Typical Quantifiers are "all," "every," "some," and "no." The phrase from the Declaration of Independence, "all men are created equal," contains the Quantifier "all." George Orwell's 1945 book ANIMAL FARM says: "All animals are equal but some animals are more equal than others." This sentence contains two Quantifiers: "all" and "some." (It also exemplifies Equivocation, discussed in Section XV.22.) The sentence "no true

Scotsman would do such a thing" contains the Quantifier "no." "No true Scotsman" is a recognized Fallacy. See Section XV.31.

The most common forms of categorical Propositions using Quantifiers are designated A, E, I and O. In the following listing, "S" stands for the subject of the Proposition and "P" stands for the predicate.

A = All S is P.
E = No S is P.
I = Some S is P.
O = Some S is not P.

When a Categorical Proposition is in one of the foregoing forms it is said to be in "Standard Form."

The first three of the foregoing Propositions are subject to Conversion, in which a new Proposition can be stated having as its subject the original predicate and having as its predicate the original subject. The following table reflects the Conversion:

Original	Converse
A All S is P	Some P is S
E No S is P	No P is S
I Some S is P	Some P is S
O Some S is not P	N/A

In the A-type Proposition, the Converse is only implied. In the E- and I-type Propositions the Converse is Logically Equivalent to the original. See Section VII.F.5 for a discussion of Logical Equivalence.

In recent times, what was traditionally called "categories" have come to be called "sets," which are groupings of objects (which may be real things, or may be purely conceptual things like numbers or mathematical functions). A set has "members." Members of a set are distinguished from non-members of that set by virtue of their membership in the set. The non-members of the set belong to another set, which is the set of things that do not belong to the first set. The set of non-members is called the "Complement" of the original set. In the A-form in foregoing listing, the set of all S is a sub-set of the set of all P. In the E-form, no member of set S are members of set P. In the I-form, some members of set S are members of set P. In the O-form, some members of set S are not members of set P.

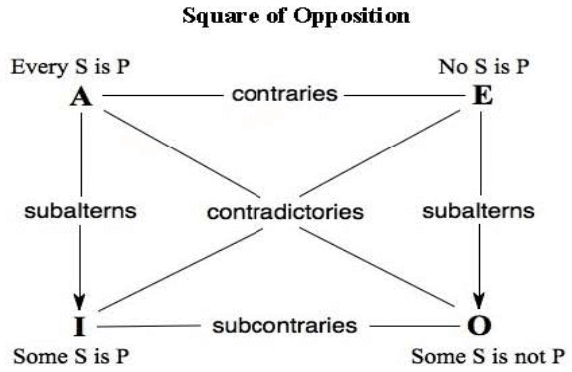
Quantifiers also involve the concept of "distribution." A Term in a Syllogism is Distributed if it extends to all or none of the members of the category or class to which it relates. The Term is Undistributed if it applies only to some of the members. Thus, the subject of the A- and E-type Propositions are Distributed, while the subject in the I- and O-type Propositions are Undistributed. The Predicate is distributed in the E and O forms, but not the A and I forms. The following table demonstrates:

Type	Distribution
A = All S is P	S= Yes P= No
E = No S is P	S= Yes P= Yes
I = Some S is P	S= No P= No
O = Some S is not P	S= No P= Yes

8. The Rules of Opposition. The A, E, I, O, and U forms discussed in the previous Section also arise in connection with the concept of Opposition. The conventional view of statements in Opposition to each other dates back to Aristotle. Aristotle envisioned categorical statements to have different forms of Opposition. Here are the Quantifiers, and their status in terms of Opposition:[107]

A = All S is P	Universal Affirmative
E = No S is P	Universal Negative
I = Some S is P	Particular Affirmative
O = Some S is not P	Particular Negative[108]

A medieval theorist named Boethius placed these terms into the "Square of Opposition:"



The Square of Opposition indicates that A and E are Contradictories; that is to say, "All S is P" is the Contradictory of "Some S is not P" and vice-versa. The Square of Opposition also indicates that I and E are Contradictories; that is to say, "Some S is P" is the Contradictory of "No S is P" and vice-versa. The Square also indicates that A is a Contrary of E; that is to say, "All S is P" is Contrary to "No S is P" and vice-versa. And the Square indicates that I is a Subcontrary to O; that is to say, "Some S is P" is the Subcontrary of "Some S is not P" and vice versa. The Square also indicates that A is a Subaltern of I; that is to say, "All S is P" is a Subaltern of "Some S is P" and vice versa. The Square indicates that E is a Subaltern of O; that is to say, "No S is P" is the Subaltern of "Some S is not P", and vice versa.[109]

The Square may help in distinguishing Contradictories, Contraries, Subcontraries, and Subalterns, which are defined as follows:

Contradictories–two Propositions are Contradictory if and only if they cannot both be true and cannot both be false.
Contraries–two Propositions are Contraries if and only if they cannot both be true but can both be false.
Subcontraries–two Propositions are Subcontraries if and only if they cannot both be false but can both be true.
Subalterns–two Propositions are Subalterns if and only if, when one Subaltern is true then the other Subaltern must be true, and when one Subaltern is false then the other Subaltern must be false.[110]

9. Rules for Syllogisms. There are six rules for Syllogisms that must be observed for the Syllogism to be in proper form. A Syllogism that violates such a rule is a Fallacy. Syllogistic Fallacies are discussed in Section VII.B.10.

Rule No. 1: A Syllogism contains three Terms, no more and no less. Aristotle wrote: "[I]t has been shown that the positing of one thing--be it one term or one premiss--never involves a necessary consequent: two premisses constitute the first and smallest foundation for drawing a conclusion at all and therefore a fortiori for the demonstrative syllogism of science."[111] For a Syllogism to work, it must contain a Major Term (that connects the Major Premise to the Conclusion), a Minor Term (that connects the Minor Premise to the Conclusion), and the Middle Term (that connects the Major Premise to the Minor Premise). If there are only two Terms, then a Syllogism cannot be constructed.

A Syllogism with four Terms occurs when what is supposed to be the Middle Term instead consists of two different words, which means that the two Premises are not connected by a shared Term. Example: "All men are mortal; Socrates is a Greek". Because there are four Terms instead of three in the two Premises, the Premises are not connected and no Conclusion can be reached. See the "Fallacy of Four Terms" in Section VII.B.10.a. Four Terms also can occur when the same word appears as the Middle Term in each Premise, but the Middle Term's meaning in the Major Premise is different from the Middle Term's meaning in the Minor Premise. This problem is called Ambiguity, and sometimes Equivocation.

Rule No. 2: The Middle Term must be distributed ("Universal") in one or both of the Premises. A Term is "distributed" when it describes the entire class to which is applies. "All" or "No" are words indicating distribution. For a Syllogism to work, the Middle Term must be distributed in either the Major Premise or in the Minor Premise. Example: "All men are mortal; Socrates is a man; therefore, Socrates is mortal". Here the Middle Term "man/men" is distributed in the Major Premise, because "all men" is distributed, or Universal. The Middle Term is not distributed in the Minor Premise because the reference is to an individual man named Socrates. If the Major Premise said "some," "many," or "most" men, and the Minor Premise were limited to one man, then the Middle Term would not be distributed in either Premise and the Syllogism would not work. Example: "Some men are mortal; Socrates is a man." You cannot conclude from the foregoing Syllogism that Socrates is mortal, because the Middle Term (man/men) is not distributed in either Premise, so that the two Premises do not indicate whether Socrates is within the portion of men who are mortal. A second example: "All A is B; some B is C". You cannot conclude from these two Premises with an Undistributed Middle Term, that "all A is C" or even that "some A is C".

Rule No. 3: Each Distributed Term in the Conclusion must be Distributed in one of the Premises. For a Syllogism to be Valid, the Conclusion cannot contain a distributed Term that is derived from a non-distributed Term in the Premises. Example: "Some A is B; all B is C; therefore, all A is C". The foregoing Syllogism is invalid because the Major Term ("A") in the Conclusion is Distributed while the Major Term in the Premises is not Distributed.

Rule No. 4: A Syllogism cannot contain two negative Premises. A Syllogism that contains two negative Premises cannot ensure that the Categories in the two Premises overlap, so there is no linkage between the two Premises that can guarantee that the Conclusion necessary follows. Example: "No A is B; no B is C". You cannot conclude from the foregoing Premises whether or not any "A" is "C". Second example: "No B is C; all A is B; therefore, no A is C". The foregoing Syllogism, with only one negative Premise, is valid. Third example: "Either X or Y, but not both; not X; therefore, Y". The foregoing Syllogism is Valid, because only one Premise is negative.

Rule No. 5: If either Premise is negative, then the Conclusion must be negative. Rule 5 says that if a Premise excludes something from a category, the Conclusion also must exclude something from a category. Example: "All A is B; no B is C; therefore, no A is C".

Rule No. 6: If both Premises are Distributed, the Conclusion must be Distributed. If the Major Term is Distributed, and the Minor Term is Distributed, then the subject of the Conclusion must be Distributed. Examples of Valid Syllogisms: "All A is B; all B is C; therefore, all A is C". "All A is B; no B is C; therefore, no A is C".

10. Fallacies of Syllogistic Logic. In Logic, a Fallacy is a logical proposition that fails to conform to the rules of Logic. Aristotle suggested several Fallacies related to the Syllogism of Deductive Logic. Subsequent writers have added more to the list.

a. The Fallacy of Four Terms. A legitimate Syllogism has three Terms: the Major Term; the Minor Term; and the Middle Term. The Fallacy of Four Terms occurs when the Syllogism has four Terms, which occurs because the Term in the Major Premise that is supposed to be the Middle Term does not match the Term in the Minor Premise that is supposed to be the Middle Term. People seldom use different words for the Middle

Term, since it is so evidently wrong. The Fallacy usually results from using same word as the Middle Term in both Premises, but where the meaning or sense of the word is different as used in each Premise. This problem arises from Ambiguity. When done intentionally, the defect is called "Equivocation."

b. The Fallacy of the Undistributed Middle Term. The Fallacy of the Undistributed Middle Term occurs when the Middle Term is not distributed in either the Major Premise or the Minor Premise, so it never refers to all members of the categories it describes. A Term is Distributed when it applies to all members of the class to which it refers. Examples:

> All Z is B
> Y is B
> Therefore, Y is Z

> All arguments with undistributed Middle terms are bad arguments.
> This is a bad argument.
> Therefore, this argument has an undistributed Middle Term.[112]

The Fallacy of the Undistributed Middle was mentioned in *Hicks v. State*, 241 S.W.3d 543, 546 (Tex. Crim. App. 2007):

> The Legislature has clearly provided the standard for establishing when an actor has assumed "care, custody, or control" of a disabled individual under subsection (b)(2). This standard is clearly and unambiguously set out in subsection (d). Although "possession" in Section 1.07(a)(39) is defined as "care, custody, or control," the court of appeals incorrectly assumed that "care, custody, or control" under Section 22.04(b)(2) means "possession." This is like saying, "I am a mammal, a dog is a mammal; therefore, I am a dog." This is the fallacy of the undistributed middle.[18] (Some footnotes omitted)
>
> FN18. Douglas Lind, Logic and Legal Reasoning 130-31 (The National Judicial College 2001).

c. The Fallacy of Illicit Process of the Major or Illicit Minor Term. Where a Conclusion contains a Distributed term that is not Distributed in its related Premise, it is called an "Illicit Process." The Illicit Process of the Major Term occurs when the Major Term is Undistributed in the Major Premise but is Distributed in the Conclusion. Example:

> All A is B
> No C is A
> Therefore, no C is B.

An illicit Minor Term occurs when the Minor Term is Undistributed in the Minor Premise but Distributed in the Conclusion. Example:

> All A is B.
> All A is C.
> Therefore, all C is B.

> All dogs are canines.
> All dogs are mammals.
> Therefore, all mammals are canines.

d. The Fallacy of Negative Premises. The rules of Syllogisms permit only one of the Premises to be negative. The Fallacy of Negative Premises occurs when both the Major Premise and the Minor Premise are negative, in which case there is no connection between the Major and the Minor Premises that can support a Conclusion. Example: "No A is B. No B is C." From these Premises, you cannot tell whether any A's are C's.

e. The Fallacy of Drawing Affirmative Conclusions From a Negative Premise. Where a Syllogism contains a negative

Premise, it cannot have an affirmative Conclusion. To do so is a Fallacy.

f. The Existential Fallacy. The Existential Fallacy occurs when a Standard Form Syllogism has two Universal Premises and a particular Conclusion. Example:

All P are Q.
All X are P.
Therefore, some X are Q.

g. Belief Bias. Modern psychologists have identified a bias in evaluating Syllogisms. Called "Belief Bias," it reflects the tendency to base the assessment of the validity of a Syllogism on the believability of its content.[113] Where belief and logic agree, logical accuracy goes up; where belief and logic disagree, logical accuracy goes down.

11. Translating Natural Language Arguments Into Syllogisms. As noted above, it is often helpful in evaluating the logic of a natural language argument to translate the argument into a Syllogism to more easily spot any syllogistic errors. The first step in translating an English language argument into a Syllogism is to locate the Conclusion. The Term in the subject of the Conclusion is the Minor Term (shared between the Minor Premise and the Conclusion). The Term in the predicate of the Conclusion is the Major Term (shared between the Major Premise and the Conclusion). The second step is to put the Syllogism in Standard Order, with the Premise containing the Major Term first, and the Premise containing the Minor Term second. The Middle Term will be the Term shared by the Major Premise and the Minor Premise. If the natural language argument is an Enthymeme, then part or all of one of its Premises may be unstated. In that event, the missing Term or Premise will have to be constructed from the Terms that are not allocated to the Premise that is explicitly stated. Once the Major, Minor, and Middle Terms are identified, the Premises can be put into Standard Form (A, E, I, O). See Section VII.B.7. Having constructed the three parts of the Syllogism, and putting them in Standard Order and Standard Form, check to see if any of the rules pertaining to Syllogism have been violated (see Section VII.B.9), so that the Syllogism constitutes a Syllogistic Fallacy (the Fallacy of Four Terms, the Fallacy of the Undistributed Middle, etc.). (See Section VII.B.10). If the Syllogism passes this structural test, then the Syllogism can be visualized using Euler Circles to test its Validity. (See Section VII.D.).

12. Viewing Legal Disputes as Syllogisms. A legal dispute often can be framed as a rule of law that operates as the Major Premise, and an adjudicative fact in the case that operates as the Minor Premise, leading to a Conclusion that suggests the outcome of the case. In some cases the dispute is over which rule of law to apply; in others, whether the facts come within the rule.[114]

C. IMPLICATION. "Implication" is a key component of Deductive Logic. Implication is also a key component of the way people think and talk about the world. Much confusion arises from the fact that, in Logic, "implication" means that one thing *necessarily* establishes another thing, while in natural language "implication" sometimes means that but also sometimes means than one thing *may* establish another thing. If we say that "X" is an event or condition, everyday reasoning is concerned not just with things that follow with certainty from X but also with things that probably follow from X or possibly follow from X.

Much modern writing on Logic is taken up with discussions about one thing implying another thing. Such propositions are called Hypothetical Propositions, to be distinguished from the Categorical Propositions discussed above in connection with Syllogisms.

Hypothetical Propositions, sometimes called "Conditional Propositions" or "Conditionals," express a relation between Terms, where the truth of one Term is dependent upon the truth of another Term. The Term that depends on the other Term is called the "Consequent." The Term on which the Consequent depends is called the "Antecedent." In a Conditional Proposition, the Antecedent is often symbolized as "P" and the Consequent is often symbolized as "Q". An Implication is often stated: "P implies Q", or "if P then Q", or "P, therefore Q".

To express the classical Syllogism in terms of a Conditional Statement, one would say that, *if* the Major Premise is true and *if* the Minor Premise is true, *then* the Conclusion must be true. The Major Premise and the Minor Premise taken together thus become the Antecedent "P", and the Conclusion becomes the Consequent "Q". Stated differently, a Syllogism, expressed as a Conditional, would take the form "if A and B are true, then C is true." Example: "If all men are mortal and Socrates is a man, then Socrates is mortal".

There are fundamental rules about Implication. One rule is that the fact that "P" is false does not, of itself, establish that "Q" is false. Example: "If it is raining, then the sidewalk is wet; it is not raining; therefore, the sidewalk must be dry." This is Invalid logic, since even if the sidewalk is not wet from rain, it could be wet for other reasons, for example if the woman next door was watering her roses.

Another rule of Implication is that the fact that "P" implies "Q" does *not* establish that "Q" implies "P." Example: "If it is raining, that means that the sidewalk is wet". However, the fact that the sidewalk is wet does not necessarily mean that it is raining. It could be that neighbor again.

Another rule is that, if "P" implies "Q", then proving that "Q" is not true means that "P" is also not true, or that "not-Q implies not-P". Example: "If it is raining, then the sidewalk is wet; the sidewalk is not wet; therefore it is not raining".

An Implication can either affirm the Term in the predicate of the sentence, or negate that Term. In other words, an Implication can suggest that "P implies Q" or that "P implies not-Q".

1. The Validity and Soundness of Implications. An Implication is Valid if and only if the Conclusion necessarily follows from the Premise. Stated differently, like other Deductive Logic, Propositions, an Implication (a Proposition in which an Antecedent implies a Consequent) is Valid if and only if there is no situation where the Antecedent is true and the Consequent is false. Even one counter-example establishes that the Implication is Invalid. An Implication is Sound whenever the Implication is logically Valid and the Antecedent is true.

Implications sometimes take the form of a logical Argument, which starts with a Premise(s), then moves through a series of deductive steps, and culminates in a Conclusion. Such a Deductive Argument is Valid when the truth of the Premise(s) guarantees the truth of the Conclusion in all instances. A Deductive Argument is Sound only when it is logically Valid and all Premises are true.

2. The Five Forms of Conditional Propositions. The following variations of Logic Propositions exist for Conditional Propositions.

Implication	If P then Q
Inverse	If not P, then not Q
Converse	If Q then P
Contrapositive	If not Q, then not P

Contradiction If P, then not Q

3. The Material Implication. In Formal Logic, the expression of an Implication is called "Material Implication" or the "Material Conditional." The Material Conditional is a special form of Conditional Proposition that has a Truth Table (see Section VII.E.) and conforms to the rules of Logic. The Symbolic Logic expression for the Material Conditional is "P ⊃ Q " or "P ⇒ Q". The Logic symbol "⊃", also called the horseshoe, indicates the Material Conditional, as does the symbol "⇒". In Logic, the Proposition "if P is true then Q is true" is the same as "if P then Q" which is the same as "P implies Q" which is the same as "P ⊃ Q" which is the same as "P ⇒ Q". Material Implication is reflexive ("P ⊃ P"), and transitive ("if P ⊃ Q, and Q ⊃ R, then P ⊃ R"). Material Implication represents only a portion of the many types of implication that occur in the natural language we use in everyday life. In this Article, the single-arrow symbol "→" is used to signify an Implication that is not a Material Conditional. Natural language conditionals have many subtle qualities and ramifications that cannot adequately be captured by the Material Conditional. See Section VII.C.14.

4. Modus Ponens (Affirming the Antecedent). *Modus ponendo ponens* (in English, "the way that affirms by affirming") is a particular form of Conditional Proposition. Modus Ponens is central to Logic, to reasoning, and to language. Modus Ponens is a rule of inference that takes the form: "if P is true, then Q is true; P is shown to be true; therefore Q must be true". Stated differently:

(1) P implies Q.
(2) P.
(3) Therefore, Q.

The foregoing Proposition, stated symbolically, is: "P ⊃ Q; P ∴ Q", where "⊃" signifies Material Implication and "∴" signifies "therefore".

In English, the "if" portion of the Conditional Proposition is the "subject term" of the sentence; the "then" portion of the Proposition is the "predicate term"; and the verb (always some form of "to be") connecting the subject to the predicate is called the "Copula" (because it couples the subject and the predicate). Modus Ponens is also called Affirming the Antecedent. A Proposition presented in Modus Ponens form is "deductive." The Proposition has two Premises: the first is that the Implication "P → Q" is true, and the second is that "P" is true. In Modus Ponens, given the truth of those two Premises, it necessarily follows that the Conclusion "Q" is true.

5. Modus Tollens (Denying the Consequent). *Modus tollendo tollens* (in English, "the way that denies by denying") is another form of Conditional Proposition. Modus Tollens is the contrapositive inference, called "Denying the Consequent," where proving that the Consequent is false establishes that the Antecedent is also false. It takes the form: "If P is true, then Q is true; Q is shown to be false; therefore, P is false". Stated differently:

(1) P implies Q.
(2) Not Q.
(3) Therefore, not P.

Stated symbolically: "P ⊃ Q; ¬ Q; ∴ ¬ P", where the logic symbol" ¬" stand for Negation and the logic symbol "∴" stands for the English word "therefore." This inference is also called the Law of Contraposition. Example: "If it rains, then the sidewalk will be wet; the sidewalk is dry; therefore, it has not rained". The Modus Tollens form can be constructed by taking the negative of the Consequent and making it the Antecedent of the Conditional, and making the negative of

the Antecedent into the Consequent of a new Conditional. Modus Tollens applies equally to Material Conditionals and to other kinds of Conditionals.

Note that Modus Tollens does not disprove the Validity of the Implication relationship. Rather, it assumes that the Implication relationship is Valid, and instead Negates the Antecedent whenever the Consequent is false. Attacking the Implication itself would require proof that the Consequent is false when the Antecedent is true.

Modus Tollens was proposed by philosopher of science Karl Popper as the engine of scientific advancement. Popper theorized that a scientific theory lasts only until it is falsified, at which time it must be replaced with a new theory. Popper went so far as to suggest that theories that could not be subjected to falsification were not scientific. This concept ended up as one criteria for the validity of scientific opinion in the *Daubert* case.[115]

6. "Not-P or Q." From the Law of the Excluded Middle, we know that "Q" is either true or false; that is, either "Q or not-Q". Modus Ponens indicates that when "P" is true, "Q" is true. One way of saying that "Q is true" is "Q". Thus, when "P" is true then Modus Ponens can be shortened from "P ⊃ Q" to "Q". Modus Tollens indicates that when "Q" is false, "P" is false. Thus, when "Q" is false, Modus Tollens can be shortened to "not-P". Thus, Modus Ponens and Modus Tollens taken together leave you with only two outcomes: "Q or Not-P." Therefore, "P⊃ Q" is logically Equivalent to "Q or not-P". By convention, logicians reverse the order by saying "not-P or Q". Because "P⊃ Q" and "not- P or Q" are logical Equivalents, they can be substituted for one another in Deductive Logic Proofs. The Paradoxes of the Material Conditional (see Section VII.N.1) could be eliminated by describing "P ⊃ Q" as "P is false or Q is true."

7. Fallacy of Denying the Antecedent. As noted above, in the Proposition "P implies Q", the Antecedent is "P" and the Consequent is "Q". A rule of Logic says that the fact that "P implies Q" does not mean "not-P implies not-Q". This logically Invalid deduction is called the "Fallacy of Denying the Antecedent." Denying the Antecedent looks like this:

(1) P implies Q.
(2) Not-P.
(3) Therefore, not-Q.

The Proposition "P implies Q" means that whenever P is true, Q must also be true. But knowing implication relationship that does not tell us what Q is when P is false.

8. Fallacy of Affirming the Consequent. A rule of Logic says that the fact that "P implies Q" does not mean "Q implies P". The Argument looks like this:

(1) P implies Q.
(2) Q.
(3) Therefore, P.

This logically Invalid deduction is called the "Fallacy of Affirming the Consequent." In the foregoing example, the Consequent "Q" has been proven, or affirmed. Affirming "Q" does not, however, affirm "P". This is because, in our example, the only logic-based relationship between "P" and "Q" we are given is that "P implies Q". This is not enough information to say whether "Q implies P". "Q" may imply "P", or it may not. We simply cannot say, if all we know is that "P implies Q".

Recap: for the Implication "P implies Q", (i) affirming the Antecedent affirms the Consequent, (ii) denying the Antecedent does not affirm or deny the Consequent, (iii) affirming the Consequent does not affirm the

Antecedent, and (iv) denying the Consequent disproves the Antecedent. If you deny the Antecedent, then the Proposition is Unsound and therefore Invalid.

9. Conditional Propositions Can Be Sorites. Conditional propositions can be stated as Sorites. In this case, the Consequent of the preceding Conditional is the Antecedent of the next.

Example:

> If A then B.
> If B, then C.
> If C, then D.
> If D, then E.
> Therefore, if A, then E.

The example restated:

> P implies Q.
> Q implies R.
> R implies S.
> S implies T.
> P.
> Therefore, T.

Stated in symbolic form:

> $P \supset Q \supset R \supset S \supset T; P; \therefore T.$

The foregoing example is called "Chain Reasoning."

10. Attacking a Conditional Proposition. There are three ways to attack the Conclusion of the Implication that "P implies Q": (i) disproving "P"; (ii) disproving "Q"; or (iii) proving that the Implication is Invalid. The first attack establishes that the Implication is Unsound, but it does not establish whether "Q" is true or false, nor does it prove that the Implication is Invalid. It merely establishes that the Implication does not apply to the facts in question.[116] The second attack negates the Consequent (which under Modus Tollens would negate the Antecedent) but does not prove that the Implication is Invalid. The third attack disproves the asserted implication relation between "P" and "Q", but it doesn't establish whether "P" or "Q" are true or false.[117]

11. Disproving a Material Implication. Given the Material Implication that "$P \supset Q$", there is a distinction between disproving "P" or disproving "Q" and disproving the Material Implication relation itself. From the perspective of Logic, the Material Conditional "$P \supset Q$" is only False when "P" is true and "Q" is false. In all other situations, "$P \supset Q$" is True. Thus, a Material Implication can be proved Invalid only by showing an instance where "P" is true and "Q" is false.

One consequence of this principle is that a Material Implication is logically True when "P" is false, regardless of whether "Q" is true or false. This is because, when "P" is false, there can be no instance where "P" is true and "Q" is false. Thus, the Material Conditional is True whenever "Q" is true, even if "P" is false, or "P" is completely unrelated to "Q". These oddities about the Material Conditional give rise to difficult conceptual issues, called Paradoxes of the Material Conditional, discussed in Section VII.N.1.

12. Biconditional. It is possible for "P" to imply "Q" *and* for "Q" to imply "P". This situation is called "Biconditional", and is represented by the double-arrow symbol "$\Leftrightarrow$". In natural language, the Biconditional is sometimes stated as "if and only if." The Biconditional logical Operator reflects that the Antecedent implies the Consequent while at the same time the Consequent implies the Antecedent. Looked at differently, the Biconditional is two linked Conditional Propositions that are both true: "$P \supset Q$" and "$Q \supset P$". Other Logic-based names for Biconditional are Equivalence and Identity. The symbol for Equivalence or Identity is

"≡". Logical Equivalence or Identity means that, from a logical perspective, the Truth Values of the Antecedent and the Consequent are the same (either both true or both false), which means that the Truth Tables are identical, and that, in logical Arguments, the terms on either side of the Biconditional are interchangeable, and can be substituted one for the other in Logic proofs.

13. Conjunctive Conditional Propositions. A Conjunctive Conditional Proposition is a Conditional Proposition that relates two or more Antecedents, joined conjunctively, to a Consequent. Example: "if A and B, then C".

14. Disjunctive Conditional Propositions. A Disjunctive Conditional Proposition is a Conditional Proposition that relates two or more Antecedents, joined disjunctively, to a Consequent. The Conditional Proposition "if either A or B or both, then C", is an instance of the Inclusive Disjunctive Conditional. (See Section VII.F.3 for discussion of Inclusive Disjunction). The Conditional Proposition "if either A or B, but not both, then C" is an instance of the Exclusive Disjunctive Conditional. (See Section VII.F.3 for discussion of Exclusive Disjunction).

The *Inclusive* Disjunctive Conditional "either A or B, or both, implies C", can be attacked in two ways: (i) disproving both "A" and "B"; and (ii) disproving the Implication relationship. Attack (i) proves the Proposition to be Unsound; attack (ii) proves the Proposition to be Invalid. An *Exclusive* Disjunctive Conditional "either A or B, but not both, implies C" can be Invalidated three ways: (i) disproving both "A" and "B"; (ii) showing that C is true when both "A" and "B" are true; or (iii) disproving the Implication relationship. Attack (i) proves the Proposition to be Unsound; attacks (ii) and (iii) prove the Proposition to be Invalid.

15. Other Conditionals. The Material Conditional ("P ⊃ Q") is only one of many types of Conditional Propositions. It is a Truth-Value-based conception, which is False when "P" is true and "Q" is false, but is True in all other instances. Treating the Material Conditional as True--when the Antecedent is false--makes little sense in terms of the way people normally use conditional statements in regular speech. In regular speech, most people link P to Q in a Conditional only when P and Q are "related," meaning that P and Q might reasonably be connected. This perceived need for relevancy has given rise to a form of logic called Relevancy Logic, which adds to the logic calculus an additional parameter that reflects a relevancy requirement. Also, in regular speech if a Conditional is asserted, and it is shown that the Antecedent is false, the normal reaction is to (improperly) treat the Conditional Proposition as Invalid or the Conclusion as false, with no thought given to the fact that the Proposition is really Unsound and that nothing can be determined about the truth of the Conclusion.

Examples of other conditionals are Indicative Conditionals, Subjunctive Conditionals, Counterfactual Conditionals, and the Material Biconditional.

a. Indicative Conditionals. "Indicative Conditional" is the name applied to "if . . . then" statements that are (usually) in the present tense and indicative mood, such as we frequently find in normal conversation. An Indicative Conditional is usually used when the speaker believes that the Consequent is highly likely or even certain to follow from the Antecedent. Example: "if you drive drunk you will go to jail." Or, "if you don't finish your homework then you can't watch television." More generally: "if A *is* true, then B *is* true".

The following is an Indicative Conditional stated in the past tense.

#1: If Booth did not kill Lincoln, then someone else did.

Fictional works, despite the fact that they are imaginary, are normally written in the present tense, indicative mood, with specific instances of past and future tenses, and the subjunctive mood. This places the reader in the time-frame of the story. Whether that is the past, present, or future–which could not be done if the subjunctive mood were used throughout.

b. Subjunctive Conditionals. Subjunctive Conditionals are "if . . . then" statements that are in the subjunctive mood rather than the indicative mood. Subjunctive conditionals are used when the truth of the Antecedent is uncertain, when the Antecedent is known to be untrue, and when the Antecedent is a future event. The subjunctive mood is also used with a true Antecedent when the likelihood that the Consequent follows from the Antecedent is questionable. Examples:

#2: If my husband got off work at 5pm today, then he will have picked up the dry cleaning.

#3: If I hadn't had to work late today, then I would have picked up the dry cleaning.

#4: If I were to use my knight to capture his bishop, and he were to take my knight with his queen, I could move my rook to put his king in check, and he would have to move his queen to block the check, which would allow me to capture his queen with my rook. Even if his king were to capture my rook, I would come out ahead in the exchange of pieces.

#5: Under the principle of Mutual Assured Destruction, if the USSR were to launch ICBMs at the USA, then the USA would launch ICBM's at the USSR, resulting in both countries being utterly destroyed, and vice-versa. Therefore, neither country will launch ICBMs.

Example #5 stated with logic symbols would be as follows. The Logic Operator "and" is symbolized by "/\". The Logic Operator "or" is symbolized by "\/". The subscript "$_L$"signifies that the country launches ICBMs ($USA_L \vee USSR_L$). The subscript "$_D$" signifies that the country is utterly destroyed ($USA_D \vee USSR_D$).

(1) $USSR_L \rightarrow USA_D$.
(2) $USSR_L \rightarrow USA_L$.
(3) $USA_L \rightarrow USSR_D$.
(4) $USSR_L$.
(5) $\therefore USA_D \wedge USSR_D$.

This logical Argument indicates that if the USSR were to launch ICBMs, then the USA would be destroyed. However, if the USSR were to launch ICMBs, then the USA would also launch ICBMs in the moments before it was destroyed. If the USA were to launch ICBMs, then the USSR would be destroyed. Therefore, if the USSR were to launch ICBMs, then it would bring about its own destruction. Since no country wants to destroy itself, the USSR will not launch ICBMs. The same goes for the USA. The principle may not work where the persons in possession of a nuclear device do not think and act rationally, or cannot be identified as belonging to a state that can be annihilated in response to a nuclear explosion.

Where the Implication relationship is taken to represent causation, it is easy to see that people deal with subjunctive conditionals constantly in their daily lives, in deciding whether to do a particular thing or not do that thing, in order to bring about or avoid a future event or future condition. Logic can help that type of task. Example: If I do X, then Y will occur. I do not want Y to occur, so I do not do X. Unfortunately, refraining from doing X does not guarantee that Y will not occur, if Y has other possible causes. Such thinking is

Denying the Antecedent, which is a logical fallacy. Y can only be avoided if you know all of the Antecedents of Y and negate all of them. However, in the special case where we know that Y will occur *if and only if* X occurs, then by avoiding X we can avoid Y. This is an example of the Biconditional.

The subjunctive mood is used when discussing how things might have been different if some event in the past had or had not occurred. (If Booth had not killed Lincoln). The subjunctive mood is also used in describing the future when the future is not certain. (If Congress were to raise the minimum wage, it would increase unemployment among the marginally employed). The subjunctive mood can also be used for the present, where the Antecedent of the Conditional Proposition is contrary to fact. Example: The commuter driving home from work sees a billboard that says: "if you lived here, you would be home by now."

c. Counterfactual Conditionals. Another type of conditional statement is the "counterfactual Conditional." A counterfactual Conditional is a Conditional has an Antecedent that the speaker knows is contrary to fact. Example: "if p were to happen then q would be the case," or "if p were to have happened then q would have happened". The speaker usually uses the subjunctive mood, but sometimes counterfactual Conditionals are stated in the indicative mood.

Subjunctive conditionals are also used when the Antecedent is an event or condition in the past that contravenes history, (i.e., if Napoleon had not invaded Russia). Example:

#6: If Booth had not killed Lincoln, then someone else would have.

Conditional #1 and Conditional #5 are worlds apart. Conditional #1 expresses certainty (i.e., it is 100% certain that someone killed Lincoln), while Conditional #6 deals with a world that might have been (noone knows for sure that someone other than Booth would have tried or been able to kill Lincoln). Another example:

#7: If Hinckley had succeeded in killing Reagan, the Berlin Wall would be standing today.

#8: If the Confederacy had won the Civil War, America would now be a voluntary union like Canada, united but with a right to withdraw from the union.

U.S. Philosopher David Lewis has suggested that counterfactual Conditionals be evaluated as true or false according to whether the Consequent is true in the 'most similar' possible world to ours for which "p" is true.

Counterfactual Conditionals are an essential part of some liability claims. Example: If the decedent had not been killed in the refinery explosion, he would have earned X dollars during his working life. Another example: If the supplier hadn't breached his contract, the business would have had a net profit of Y dollars.

16. The Dilemma. In Logic, a Dilemma is a Proposition in which two options lead to the same Conclusion. A Dilemma is symbolized as follows:

A or B
A → C
B → C
Therefore, C

A Dilemma in ordinary speech has a different meaning. It usually means the necessity of choosing between two or more options, each of which leads to a different but nonetheless disagreeable outcome.

A logical dilemma was depicted in CATCH-22. "In Joseph Heller's novel of this title, American pilots in the second World War learned that they could not avoid flying bombing missions unless they were crazy; to be relieved from duty, they had to request a reprieve. The 'catch-22' was that the very act of seeking to avoid hazardous combat duty demonstrated a pilot's sanity, thereby ensuring a denial of the request."[118]

17. Degrees of Conditionals. Conditional statements are sometimes categorized as zero, first, second, and third conditionals. Zero conditionals are always true when the Antecedent is true. Example: "If you heat water to 210°, it will boil." With a "first conditional," the Antecedent must occur for the Consequent to be possible. Example: "If you unlock the door, I can come inside." A "second conditional" involves an imaginary present Antecedent and an unlikely future Consequent. Example: "If I had $200,000, I would buy a Maserati," or "if I buy a lottery ticket I might win a million dollars." A "third conditional" describes a past that did not happen and a Consequent that is imaginary. Example: "When Strom Thurmond ran for President, we voted for him. We're proud of it. And if the rest of the country had followed our lead, we wouldn't have had all these problems over the years, either."[119]

18. Disproving Other Conditionals. A Conditional Proposition (or Implication) "P → Q" (which is *not* the Material Conditional) can be disproved by finding a counter example where "P" is true and "Q" is false. This is particularly so when the Implication is meant to suggest that P *causes* Q. The history of science is filled with examples of observations of natural phenomena and the conduct of contrived experiments designed to demonstrate or disprove claims of causation, which is a form of Implication.

The Premise of a Conditional Proposition can be disapproved in two ways: by proving that "P" is false, or by proving that "Q" is false. The latter method is an instance of Modus Tollens.

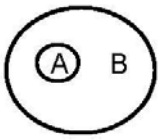
It is necessary to distinguish disproving the Conditional Proposition from Denying the Antecedent or Denying the Consequent. To disprove the Conditional Proposition, you must show that, in at least one instance, the Antecedent is true when Consequent is false. Denying the Antecedent establishes that "P" is not true, and that the Proposition is therefore Unsound. Denying the Consequent establishes that Q is not true and that therefore the Antecedent "P" is not true. Denying the Consequent is discussed in Section VII.C.5.

19. Legal Presumptions. Some legal presumptions are "structural," meaning that they assign the burden of persuasion in a court case. Examples include the presumption of innocence in a criminal case,[120] and the presumption of community property in a marital property dispute.[121]

Apart from structural presumptions like these, there are a host of other legal presumptions that indicate that proof of a particular fact permits or requires the fact finder to draw a certain conclusion. In this Article, such presumptions are called "particular" presumptions. Particular presumptions are a form of indicative conditional statement, P → Q. Some particular presumptions are rebuttable, and some are not. In some instances, two or more presumptions can collide, and it is necessary to determine which of the opposing presumptions will prevail.

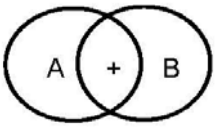
D. EULER CIRCLES. One way to visualize a logical proposition is to use a diagram called an "Euler Circle," originated in 1768 by Leonhard Euler, a Swiss mathematician. In an Euler Circle, a classification is represented by a circle.[122] All

instances of that classification fall within that circle. The proposition that "All A is B" is depicted:



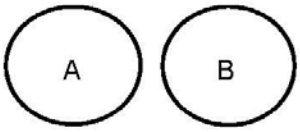
In the foregoing Euler Circles, since all As are Bs, the circle of all As is totally inside the circle of all Bs. The foregoing diagram also depicts the conditional proposition that "A implies B" (A ⊃ B) and that "not-B implies not-A" (¬ B ⊃ ¬ A). The foregoing diagram also indicates that some B is A.

If only "some A is B", then the Euler Circles look like this:



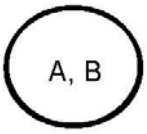
With the foregoing Euler Circles, some As fall within the circle of Bs, but some As fall outside the circle of Bs. The portion of As that are Bs falls within the area where the two circles overlap, marked in the foregoing Euler Circles with the "+" sign. The foregoing Euler Circles also indicate both that some As are Bs and that some Bs are As.

If "no A is B," then the circle of As does not overlap the circle of Bs:



The foregoing Euler Circles also reflect that "no B is A". The proposition that "no A is B" and the proposition that "no B is A" are logically Equivalent.

If all As are Bs and all Bs are As, then the circle of As is coterminous with the circle of Bs:

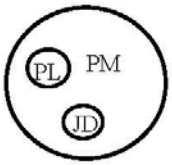


The foregoing Euler Circles reflect Logical Equivalence (A ≡ B) or the Biconditional (A ↔ B)

The following Syllogism reflects the Fallacy of the Undistributed Middle:

(1) All politicians are pompous.
(2) John Doe is pompous.
(3) Therefore, John Doe is a politician.

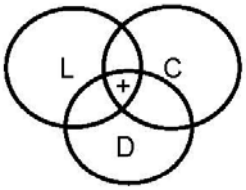
The reasoning is fallacious, because John Doe could be pompous even if he is not a politician, say if, for example, he is a college professor.[123] Expressed with Euler Circles (where Politicians are "PL", Pompous is "PM", and John Doe is "JD"):



If Circle PL is the universe of all politicians, and Circle PM is the universe of pompous persons, and Circle JD is John Doe, then to say that "all PL is PM" (i.e., all politicians are pompous) means that the Circle PL is inside Circle PM. Likewise, to say that "John Doe is pompous: means that the Circle JD is inside the Circle PM. But as the Euler Circles show, the fact that the Circle of PLs and the Circle of JD are both within the Circle of PM does not guarantee that the Circle of Pls and the Circle of JD coincide.

Euler Circles can be used to visualize a number of different propositions. For example, Euler Circles can be constructed for

a lawsuit to recover damages, where "L" is liability, "C" is causation, "D" is damages:



The plaintiff recovers a judgment only in the area with a "+," where liability, causation, and damages, coincide.

E. TRUTH TABLES. Truth Tables were developed as an effective way to visualize whether a logical proposition is True or False for every Truth Value of each component of the Proposition.

A Truth Table consists of all possible combinations of Truth Values of a Logic Statement or Proposition. The Truth Table for the Statement "P" is:

Truth Table for "P"

P
T
F

A Truth Table for the two Statements "P" and "Q" is:

Truth Table for "P" and "Q"

P	Q
T	T
T	F
F	T
F	F

The following Truth Table pertains to the Logic Operator "Logical Conjunction." Logical Conjunction is signified by the word "And"; it operates like the conjunction "and" in standard English. When two Statements in a logic Proposition are joined by an "And," the Proposition is True if and only if both Statements are true. The logic symbol for Conjunction is "∧".

In the following Truth Tables, "P" and "Q" are Statements; "P ∧ Q" is a Proposition; "T" means "true; " and "F" means "false."

Truth Table for
Logical Conjunction (and)

P	Q	P ∧ Q
T	T	T
T	F	F
F	T	F
F	F	F

The Truth Table for Logical Conjunction reads like this:

(1st row) if P is true and Q is true, then "P ∧ Q" is true.

(2nd row) if P is true and Q is false, then "P ∧ Q" is false.

(3rd row) if P is false and Q is true, then "P ∧ Q" is false.

(4th row) if P is false and Q is false, then "P ∧ Q" is false.

Note that in a Truth Table there is a column for each Statement of the Proposition, plus a column for the Proposition itself. The column under the Proposition indicates whether the Proposition is logically True or False, which in turn depends upon the Truth Values of each Statement making up the Proposition. Every possible combination of True and False, for all Statements that make up the Proposition, are recorded in the Truth Table.

If there are more than two Statements in a Proposition, then the Truth Table widens and lengthens. (The number of columns is ^{n} and the number of rows is 2^{n}, or two to the nth power, where "n" is the number of statements in the proposition. For three statements joined conjunctively, the Truth Table looks like this:

P	Q	R	P ∧ Q ∧ R
T	T	T	T
T	T	F	F
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

In law, the burden of persuasion requires the party asserting a proposition to prove the "truth" of the proposition. In a simple lawsuit to recover damages, the plaintiff must prove liability (L) *and* causation (C) *and* damages (D), to win a money judgment. This is a specific application of the general proposition "P ∧ Q ∧ R". Here is the Truth Table for a simple damage suit, where "J" is a judgment for the plaintiff:

L	C	D	J
T	T	T	T
T	T	F	F
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

F. LOGIC CONNECTORS. The branch of Logic that focuses on the role of Logic Connectors is called Propositional Logic. Logic Connectors connect two or more Statements (or elements) in a logical Proposition. Logic Connectors include: not; and; or; equivalent; nonequivalent; implies; NAND; NOR; NOT; XNOR; and XOR (more precisely, "not" is a Logic Operator, not a Logic Connector). The Logic Connectors are discussed below.[124]

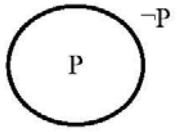
1. Logical Negation. In Logic, Negation means the opposite of the term, Statement or Proposition that is being Negated. For example, the Negation of "P" is "¬ P", where the symbol "¬" means "not." Negation is similar to the word "not" in normal language, or a prefix (like "un") that reverses the meaning of the word or concept. As a Logic Operator, Negation applies to the first meaningful proposition to the right of the Negation sign. As a consequence, if the intent is to negate a compound Proposition, it is necessary to put the compound Proposition in parenthesis. Otherwise the negative operator would apply only to the first element of the Compound Proposition. Example: compare "¬ P And Q" to "¬ (P And Q)". The first proposition is True when "P" is false and "Q" is true. The second Proposition is True when either "P" or "Q" is false, or both, are false. See the discussion of Conjunction in the next section.

The Truth Table for Negation is:

P	¬ P
T	F
F	T

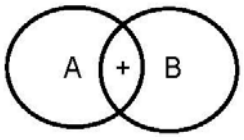
The Truth Table for Negation reads like this:
(1st row) If P is true, then ¬ P is false.
(2nd row) If P is false, then ¬ P is true.
Under the Law of Contradiction, "P" and "¬ P" cannot both be true or both be false.

The Euler Circle for Negation is:



Everything that is "P" is inside the P-Circle; everything that is "not-P" is outside the P-Circle.

2. Logical Conjunction. In formal Logic, as well as in grammar, two Statements joined by the word "And" are "Conjunctive." The Logic Connector symbol for "And" is "∧", an upside-down V. A Proposition consisting of two terms connected by an "And" Connector is logically True only if both terms are true. If three, four, or more Statements are conjunctively joined into one Proposition, the Proposition is logically True if and only if all Statements in the Proposition are true. The Truth Table for Conjunction is set out in Section VII.E. above. The Euler Circles for the Conjunction of two terms are:



The Proposition "A and B" is true only for the area where the two circles overlap, marked with a "+."

(The following list uses Logic Connectors, which are discussed in greater detail later in this Section.) Conjunction has the following logical properties (where "∨" signifies Logical Disjunction, and "≡" signifies "Logically Equivalent").

Associative: $A \wedge (B \wedge C) \equiv (A \wedge B) \wedge C$

Commutative: $A \wedge B \equiv B \wedge A$

Distributive: $A \wedge (B \vee C) \equiv (A \wedge B) \vee (A \wedge C)$

Idempotent:[125] $A \wedge A \equiv A$

"Truth-preserving," meaning that when all variables in a Proposition are true, the Proposition is True.

"Falsehood-preserving," meaning that when all variables in a Proposition are false, the Proposition is False.

"A and B" is a common "search term" on Westlaw and Lexis. It returns legal authorities that contain both terms. Conjunction is a powerful way to narrow a computer-based search. The foregoing Euler Circle reflects that "A and B" is a subset of all A's and all B's.

The Logic Operator "And" is similar to but not the same as the English conjunction "and." In natural English, the word "and" sometimes connotes sequence, as in "I ate breakfast and went to work." The English "and" also sometimes implies a division of the whole into parts, as in "police cars are black and white," meaning not that the car is all black and at the same time all white, but rather that part of the police car is black and part is white. The English "and" sometimes joins two or more terms in the subject or predicate of a sentence, like "Jack and Jill went up the hill." There are other examples of English usage that differ from the logical Operator.

3. Logical Disjunction. Logical "Disjunction" is a logical Operator analogous to the English word "or." A Proposition consisting of two Statements connected by the Operator "Or" is "Disjunctive." There are two types of Disjunction: Inclusive and Exclusive. Inclusive Disjunction permits the Proposition "A Or B" to be True if either A is true or B is true, or both are true. Stated in natural language, a logical Proposition consisting of two Statements joined by an "inclusive or" Connector is True if either or both Statements are true. If three or more Statements are joined by Inclusive Disjunction, the Proposition is True if any one or more of the Statements is true. The Inclusive Disjunctive Proposition is False if and only if all Statements in the Proposition are false.

Logical Propositions can be joined Disjunctively, with the same effect. A real world example of the Inclusive Disjunction occurs in a cafeteria, where you can have green beans, mashed potatoes, black eyed peas, french fries, or another vegetable. Selection of one does not preclude selection of another. The Logic symbol for Inclusive Disjunction is "$\vee$" and is written "OR."

The other instance of disjunction is the "Exclusive Disjunction." The "exclusive or" allows the Disjunctive Proposition "A Or B" to be True if either A is true or B is true, but not both. If three or more Statements are joined by the Exclusive Disjunction, the Proposition is True if and only if one, and only one, of the Statements is true. If more than one Statement is true, or if all Statements in the Proposition are false, then the Proposition is False. A real world example of Exclusive Disjunction is: you can be either in Dallas or Houston at 10:00 a.m. tomorrow, but not both. The Logic Operator symbol for Exclusive Disjunction is "$\veebar$" and is written "XOR." A mathematical example of Exclusive Disjunction: an integer is either odd or even.

Often a sentence in English doesn't tell you whether the Inclusive Disjunction or the Exclusive Disjunction is intended. In natural language sentences, we can usually rely on context or common sense to tell us which type of disjunction is intended. However, Logic does not rely on context or common sense. Logic requires that you specify the form of "or" you are using in a disjunctive proposition.

Disjunction has the following logical properties:

Associative: $A \vee (B \vee C) \equiv (A \vee B) \vee C$

Commutative:[126] $A \vee B \equiv B \vee A$

Distributive: $A \vee (B \wedge C) \equiv (A \vee B) \wedge (A \vee C)$

$A \wedge (B \vee C) \equiv (A \wedge B) \vee (A \wedge C)$

Idempotent:[127] $A \vee A \equiv A$

Truth-preserving: meaning that when all variables in a Proposition are true, the Proposition is True.

Falsehood-preserving: meaning that when all variables in a Proposition are false, the Proposition is False.

The Truth Table for two statements joined by Inclusive Disjunction is:

Inclusive Disjunction ($\vee$) or (OR)

P	Q	P $\vee$ Q
T	T	T
T	F	T
F	T	T
F	F	F

The Inclusive Disjunction Truth Table indicates:

(1st Row) When "P" is true and "Q" is true, then the Proposition "P $\vee$ Q" is True.

(2nd Row) When "P" is true and "Q" is false, then the Proposition "P $\vee$ Q" is True.

(3rd Row) When "P" is false and "Q" is true, then the Proposition "P $\vee$ Q" is True.

(4th Row) When "P" is false and "Q" is false, then the Proposition "P $\vee$ Q" is False.

Examples of Inclusive Disjunction:

A 17-year old female is an adult if (i) she is married,[128] or (ii) she has had her disabilities of minority removed by a court, or (iii) or both.

The Truth Table for two statements joined by Exclusive Disjunction is:

Exclusive Disjunction
(⩒) or (XOR)

P	Q	P ⩒ Q
T	T	F
T	F	T
F	T	T
F	F	F

The Exclusive Disjunction Truth Table indicates:
(1st Row) When both P and Q are true, then the proposition "P ⩒ Q" is false.
(2nd Row) When P is true and Q is false, then the proposition "P ⩒ Q" is true.
(3rd Row) When P is false and Q is true, then the proposition "P ⩒ Q" is true.
(4th Row) When both P and Q are false, then the proposition "P ⩒ Q" is false.

Examples of Exclusive Disjunction:

- A "true-false" test.
- A multiple choice test.
- Game show host: "Do you want what's behind Door No. 1, Door No 2, or Door No. 3?"
- Aristotle's Law of Excluded Middle: "Either A is B or A is not B". Expressed symbolically: (A = B) ⩒ (A ≠ B).
- A real number is either odd or even.
- Either God exists or God does not exist.
- President Bush: "Either you are with us, or you are with the terrorists."
- A person is an American citizen if (i) she was born in America, or (ii) she has been "naturalized" by a federal judge.

Disjunctive propositions involving the Exclusive Disjunction, would take the following form:

1. P ⩒ Q.
2. P.
3. ∴ ¬ Q.

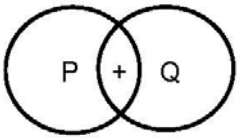
The foregoing Argument expressed in English is: either P is true or Q is true, but not both; P is true; therefore, Q is false.

Or:

1. P ⩒ Q.
2. ¬ P.
3. ∴ ¬ Q.

The foregoing Argument, expressed in English is: either P is true, or Q is true, but not both; P is false; therefore, Q is true.

The following Euler Circles depict both Inclusive Disjunction and Exclusive Disjunction:



The Inclusive Disjunction is true for everything that is inside either the P-Circle or the Q-Circle or both. The Exclusive Disjunction is true for everything that is within the parts of P-Circle or the Q-Circle that do *not* overlap (i.e., excluding the area with a + sign).

4. Material Implication. Material Implication, discussed in Section VII.C.3 above, has the following Truth Table:

P	Q	P ⊃ Q
T	T	T
T	F	F
F	T	T
F	F	T

If "P ⊃ Q" is True, and P is true, then Q must be true. If P is true and Q is false, then "P ⊃ Q" is False. The first row of the foregoing

Truth Table exemplifies Modus Ponens (i.e., if P is true then Q must be true). The fourth row of the foregoing Truth Table exemplifies Modus Tollens (i.e., if "P ⊃ Q" is True, and Q is false, then P must also be false.) Note that, for the Material Conditional, if P is false then "P ⊃ Q" is True, regardless of whether Q is true or false. This leads to the problem of Explosion, discussed in Section VII.B.5.

The Truth Table reflects an important aspect of the Material Conditional: the Material Conditional is False only when P is true and Q is false. In all other instances, the Material Conditional is True. The fact that the Material Conditional is True whenever P is true, regardless of whether Q is true or false, creates conceptual problems when dealing with "real world" Conditionals and limits the usefulness of the Material Conditional as a way to express natural language Conditionals. See Section VII.N.

The Euler Circles for all kinds of implication looks like this:

The foregoing Euler Circles reflect that all instances of P are also instances of Q, which allows us to say that P implies Q. However, Q may include instances that are not P, showing that Q does not necessarily imply P. If Q is Negated, then P is also Negated, because all instances of ¬ Q lie outside of the Q-circle, while all instance of P lie within the Q-circle. From a categorical perspective, the foregoing Euler Circles reflect that all Ps are Qs, while some Qs are Ps. Stated in terms of Implication: "P implies Q"; "Q *can* imply P";" not-Q implies not-P"; "not-P can imply not-Q".

Aristotle's simple declaratory Syllogism can be expressed in Propositional Logic: (P ∧ Q) ⊃ R, where P is the Major Premise, Q is the Minor Premise, and R is the Conclusion. When the Major Premise (P) is true, and the Minor Premise (Q) is true, then the Conclusion (R) necessarily is true.

5. Material Equivalence. "Material Equivalence" is a Logic Operator that signifies that two terms are true together or false together. Material Equivalence is different from equality, because equals are the same while Material Equivalents merely have the same Truth Values for every Truth Value of Terms that make up the Proposition (i.e., either both are true or both are false). Both Statements and Propositions, as used in this Article (see Section VI.B.), can be Material Equivalents.

Symbolically, Material Equivalence is signified by "≡" or "↔." This Logic Operator is also called Biconditional. The Proposition "A ≡ B" is True when A and B are both true or are both false. The Proposition A ≡ B is False when A is true and B is false, and when A is false and B is true. The Truth Table for Material Equivalence is:

A	B	A ≡ B
T	T	T
T	F	F
F	T	F
F	F	T

Here are some Material Equivalents expressed in symbolic Logic:

(1) ¬ (P ∧ Q) ≡ ¬ P ∨ ¬ Q. This means that the Negation of the Conjunctive Proposition "P And Q" is Materially Equivalent to the

Disjunctive Proposition "not-P or not-Q." Put differently, the statement "P And Q" is False if either "P" is false or "Q" is false. See Alternative Denial, at Section VII.F.7.

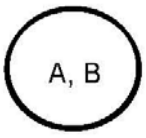
(2) $\neg (P \vee Q) \equiv \neg P \wedge \neg Q$. This means that Negation of the Disjunctive Proposition "P Or Q" is "not-P And not-Q." Put differently, the statement "P Or Q" is False when both P and Q are false.

(3) $P \supset Q \equiv \neg Q \supset \neg P$. This means that the Material Conditional Proposition "P implies Q" is Materially Equivalent to the Material Conditional Proposition "Not - Q implies not - P". This is Modus Tollens, discussed in Section VII.C.4.

(4) $P \supset Q \equiv \neg P \vee Q$. This means that the Material Conditional Proposition "P implies Q" is Materially Equivalent to "$\neg P \vee Q$", and indicates that either "P" is false or "Q" is true. This is because when "P" is true then "Q" is also true (Modus Ponens), but when Q is false then P is also false (Modus Tollens). See Section VII.C. 4 & 5.

(5) Some S is P ≡ Some P is S. This is Conversion. No S is P ≡ No P is S. This also is Conversion. Conversion is the process of creating a new Conditional Proposition by switching the subject and the predicate of the original Conditional Proposition. See Section VII.B.7.

The Euler Circles for Material Equivalence are:



In the foregoing Euler Circles, the A-circle and the B-circle are coterminous, meaning that all A's are B's and all B's are A's.

6. Material Nonequivalence. "Material Nonequivalence" is a Logic Operator that signifies that two terms always have opposite Truth Values. Terms with opposite Truth Values are called "Contradictories." See The Square of Opposition, at Section VII.B.8.

Symbolically, Material Nonequivalence is signified by "$\neq$". The Proposition "$A \neq B$" is True where A and B have opposite Truth Values, so that when A is true then B is false, and when A is false then B is true. The Proposition "$A \neq B$" is False when A and B are both true, and when A and B are both false. The Truth Table for Material Nonequivalence is:

A	B	$A \neq B$
T	T	F
T	F	T
F	T	T
F	F	F

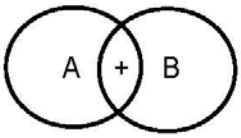
Here are some Material Nonequivalents
(1) $A \neq \neg A$
(2) $(P \supset Q) \neq (P \supset \neg Q)$

The Euler Circles for nonequivalence are:

In the foregoing Euler Circles, the A-Circle and the B-Circle do not overlap, meaning that no As are Bs which means that no Bs are As.

7. Alternative Denial. In Propositional Logic, "Alternative Denial" means that the Proposition "A And B" is False when either "A" is false or "B" is false, or both are false. In Propositional Logic "Alternative Denial" is expressed "$\neg A \vee \neg B$." In Symbolic Logic, Alternative Denial is depicted "$A \mid B$". The verbal Connector for Alternative Denial is "NAND."

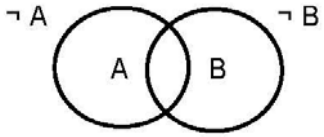
In Euler Circles, Alternative Denial is represented by all area outside the overlap of the A-Circle with the B-Circle (marked with a + sign):



8. Joint Denial. In Propositional Logic, Joint Denial means that the Proposition "A And B" is False only when *both* A and B are false. In English the phrase used to indicate Joint Denial is "neither A nor B." In Propositional Logic, Joint Denial is depicted "¬ A ∧ ¬ B". In Symbolic Logic, Joint Denial is depicted "A ↓ B". The verbal indicator for Joint Denial is "A NOR B". The Truth Table for Joint Denial is:

A	B	A NOR B
T	T	F
T	F	F
F	T	F
F	F	T

In Euler Circles, Joint Denial is represented by everything outside of both circles:



G. SYMBOLIC LOGIC. Symbolic Logic uses symbols to signify the Logic Operators used in Propositions and Arguments. It is similar to mathematics in the sense that there are special symbols that can be used in processes that follow rigid rules. Once these symbols and rules have been learned, allowing Logic operations to be expressed without words, it is much easier to both express and understand the way Logic works. Symbolic logic is divided into Propositional Logic and Predicate Logic. Propositional Logic uses symbols to stand for Logic Propositions and Logic Connectors. Propositional Logic only considers whether a Proposition is true or false. Predicate logic is an extension of Propositional Logic that uses variables that can be quantified.

Here are some logical Propositions expressed in Symbolic Logic:

(i) *Modus Ponens:* P ⊃ Q; P; ∴Q
(ii) *Modus Tollens:* P ⊃ Q; ¬ Q; ∴ ¬ P
(iii) The Law of Identity: A ≡ A -or- A ⇔ A
(iv) The Law of Contradiction:
A ≠ ¬ A -or- ¬ (P ∧ ¬ Q)
(v) The Law of the Excluded Middle: A ∨ ¬ A
(vi) Material Implication: P ⊃ Q ≡ ¬ P ∨ Q

H. TAUTOLOGIES AND SELF-CONTRADICTIONS. The ancient Greeks defined Tautology as a logical statement that says that a thing is the same as itself. An example of a mathematical tautology would be 2 = 2 or (x + 4) = (4 + x). In Logic this is called the Law of Identity. In terms of practical utility, a Tautology tells you nothing that you don't already know. However, if someone proposes that A and B are different, and you demonstrate that A and B are the same, you have refuted the proposition, which may prompt the proponent to reconsider her position.

In Propositional Logic, a Tautology is a Logic Proposition or formula that is always true, regardless of whether the individual terms of the Proposition are true or false. An example is Aristotle's Law of the Excluded Middle, which can be expressed in symbols as "A ⩒ ¬ A", and in words as "either A or not-A, but not both", meaning that a particular thing is either itself or it is not itself, but it cannot be both. The Truth Table for "A ⩒ ¬A" (either A or not-A but not both) is:

A	¬ A	A ⩒ ¬ A
T	F	T
F	T	T

Note that the T-T-F and F-F-F rows are omitted because, under the Law of Contradiction, A and ¬A cannot have the same Truth Value–that is, they cannot both be True or both be False.

Here are more Tautologies:

(A ∧ B) ∨ (¬A) ∨ (¬B).
The foregoing Proposition can be stated: Either A and B are both true or else A is false or B is false.

Law of Contraposition: (A ⊃ B) ⇔ (¬B ⊃ ¬A).

Indirect proof, known as Reductio ad Absurdum: ((¬A ⊃ B) ∧ (¬A ⊃ ¬B)) ⊃ A. Indirect proof is discussed in Section VI.J.3.

A Self-Contradiction is a logical Proposition that is always False regardless of whether the terms of the Proposition are True or False. The Proposition "A And Not-A" (A ∧ ¬A), is a Self-Contradiction because, under all conditions, a thing cannot be both A and not-A. The Truth Table for the Proposition "A ∧ ¬ A" is:

A	¬A	A ∧ ¬ A
T	F	F
F	T	F

A Proposition that is neither a Tautology nor a Self-Contradiction is called a "Contingent" Proposition. It is True for some Truth Values of its Terms but not others.

A definition is a Tautology, but definitions are nonetheless useful in that they describe an unknown word using words that are known, or permit a longer phrase or more complicated description to be represented by a single word or shorter phrase.

I. AXIOMS. An "Axiom, " also called a "Postulate," is a statement regarded as being self-evidently true without proof.[129] Many logical Arguments start with an Axiom in order to avoid an infinite regression in search of a starting assumption.[130] Success in using a self-evident assumption, as the first step in a line of reasoning, depends upon the audience's agreeing with the Axiom.

One familiar Axiom is Rene Descartes' assertion: "Cogito ergo sum," (I think; therefore, I am). In pursuing his "Method" of analysis, Descartes had challenged the assumptions underlying all of his beliefs and arrived at the one bedrock belief that he could not doubt without creating a logical paradox: Descartes could doubt everything except that he could not doubt the existence of his consciousness that was doing the doubting. He took this as his starting point for building a new view of the world.

The American Declaration of Independence begins with several Axioms:

> We hold these truths to be self-evident: that all men are created equal, that they are endowed by their Creator with certain Unalienable Rights, that among these are Life, Liberty, and the pursuit of Happiness."[131]

J. CONSTRUCTING DEDUCTIVE ARGUMENTS IN PROPOSITIONAL LOGIC. This subsection of the Article discusses constructing deductive arguments expressed in Propositional Logic.

1. Direct Deductive Arguments. A Deductive Logic Argument is a step-by-step proof that one or more Premises lead with certainty to a particular Conclusion. The process of connecting the Premises to the

Conclusion is done using "Rules of Inference" and "Rules of Replacement." In a Direct Deductive Argument, every step of the proof is either a Premise, or a Rule of Inference, or a Rule of Replacement, or a Conclusion.[132]

a. Rules of Inference. Here are some Rules of Inference that allow you to move from one step of an Argument to a subsequent step, in a deductive fashion:[133]

(1) Syllogism

$$(A \supset B) \wedge (B \supset C) \supset (A \supset C)$$

The fact that A implies B and B implies C means that A implies C.

(2) Modus Ponens

$$P \supset Q$$
$$P$$
$$\therefore Q$$

If P implies Q, and if P is true then Q is also true. In different words, given a Material Implication, if we know that the Antecedent is true then we know that the Consequent is true, under the rule of Modus Ponens.

(3) Modus Tollens

$$P \supset Q$$
$$\neg Q$$
$$\therefore \neg P$$

If P implies Q, and Q is not true, then P is not true.

(4) Proof by Cases

$$((A \vee B) \wedge (A \supset C) \wedge (B \supset C)) \supset C$$

If "A implies C" and "B implies C", then C is true if either A or B (or both) is true.

(5) Exclusive Disjunctive Syllogism

$$A \vee B \qquad A \vee B$$
$$\neg A \quad \text{or} \quad \neg B$$
$$\therefore B \qquad \therefore A$$

(First iteration): If the Proposition "A Or B" is True, and A is not true, then B must be true. (Second iteration): If the Proposition "A Or B" is True, and B is not true, then A must be true.

(6) Disjunction Introduction (Addition)

$$A \qquad B$$
$$\therefore A \vee B \quad \text{or} \quad \therefore A \vee B$$

(First iteration): If A is true, then the Proposition "A Or B" is true. (Second iteration): If B is true, then the Proposition "A Or B" is True. This follows from the fact that a Disjunctive Proposition is True if any Term in the Proposition is true.

(7) Simplification

$$A \wedge B \qquad A \wedge B$$
$$\therefore A \quad \text{or} \quad \therefore B$$

(First iteration): If the Proposition "A And B" is True, then A is true. (Second iteration): If the Proposition "A And B" is True, then B is true. Stated differently, if a conjunction of terms is True, then each term of the Conjunction Proposition must be true.

(8) Conjunction Introduction

$$A$$
$$B$$
$$\therefore A \wedge B$$

If A is true and B is true, then the Proposition "A And B" is True.

(9) Conjunction Elimination

$$A \wedge B \qquad A \wedge B$$
$$\therefore A \quad \text{or} \quad \therefore B$$

(First iteration): If the Proposition "A And B" is True, then A is true. (Second iteration): If the Proposition "A And B" is True, then B is true.

(10) Hypothetical Syllogism (Chain Reasoning)

$P \supset Q$
$Q \supset R$
$\therefore P \supset R$

If P implies Q and Q implies R, then P implies R.

(11) Constructive Dilemma

$(A \supset B) \wedge (C \supset D)$
$A \vee C$
$\therefore B \vee D$

If A implies B and C implies D, and either A is true or C is true, then either B is true or D is true.

(12) Absorption

$A \supset B$
$\therefore A \supset (A \wedge B)$

If the Proposition "A implies B" is True, and A is true, then A and B are both true.

(13) Conversion (A-Type)

All S is P $\supset$ Some P is S

If all instances of S are also instances of P, then some instances of P are also instances of S.

b. Rules of Replacement. Rules of Replacement allow you to substitute Terms in an Argument, where the Terms are Materially Equivalent. Here are some Rules of Replacement.[134]

(1) Double Negation (or "Negation Elimination")

$\neg \neg A \equiv A$

Not "not-A" is A.

(2) Commutativity

$A \wedge B \equiv B \wedge A$

The Proposition "A and B" is Logically Equivalent to the Proposition "B and A".

(3) Associativity

$(A \wedge B) \wedge C \equiv A \wedge (B \wedge C)$

The Compound Proposition of "A and B" coupled with "C" is Logically Equivalent to the Compound Proposition of "A" coupled with "B and C".

(4) Tautology

$A \equiv (A \vee A)$

"A" is Logically Equivalent to "A or A". The proposition is always true no matter what "A" is.

(5) DeMorgan's Law

$\neg(A \wedge B) \equiv (\neg A \vee \neg B)$
$\neg(A \vee B) \equiv (\neg A \wedge \neg B)$

The Negation of the Proposition "A and B" is Logically Equivalent to the Proposition "Not-A or Not-B". DeMorgan's Law also holds for the Negation of the Proposition "A or B", which is Logically Equivalent to "Not-A and Not-B".

(6) Transposition (or "Contraposition")

$A \supset B \equiv \neg B \supset \neg A$

The Material Implication "A implies B" is Logically Equivalent to the Material Implication "not-B implies not-A". This is Modus Tollens, often called the "Contrapostive."

(7) Material Implication

$$A \supset B \equiv \neg A \vee B$$

The Material Implication "A implies B" is Logically Equivalent to the Proposition "not-A or B". See Section VII.C.6.

(8) Exportation

$$A \supset (B \supset C) \equiv (A \wedge B) \supset C$$

The Proposition that "A implies that B implies C" is Logically Equivalent to the Proposition that "if A and B are both true, then C is true".

(9) Distribution

$$A \wedge (B \vee C) \equiv (A \wedge B) \vee (A \wedge C)$$
$$A \vee (B \wedge C) \equiv (A \vee B) \wedge (A \vee C)$$

(First iteration): Saying that A is true and either B or C is true is Logically Equivalent to saying that "A and B" is True or "A and C" is True. (Second iteration): Saying that "either A is true or B and C are true" is Logically Equivalent to saying that the Proposition "A or B" and "A or C" are both True.

(10) Material Equivalence

$$A \Leftrightarrow B \equiv A \supset B \wedge B \supset A$$
$$A \Leftrightarrow B \equiv (A \wedge B)$$
$$A \Leftrightarrow B \equiv (\neg A \wedge \neg B)$$

(First iteration): The Proposition "A if and only if B" is Logically Equivalent to the Compound Proposition "A implies B and B implies A". (Second iteration): The Proposition "A if and only if B" is Logically Equivalent to the Proposition "A and B". (Third Iteration): The Proposition "A if and only if B" is Logically Equivalent to the Proposition "not-A and not-B".

(11) Conversion (E- and I-Type)

No S is P ≡ No P is S
Some S is P ≡ Some P is S

(First iteration): The Proposition "no S is P" has as its Converse[135] the Logically Equivalent Proposition "no P is S". (Second iteration): The Proposition "some S is P" has as its Converse the Logically Equivalent Proposition "some P is S".

c. Logic Arguments. Here are two examples of logic arguments. They are different proofs of Logical Equivalence for the Material Implication.

Proof that $(P \supset Q) \equiv \neg P \wedge Q$

(1)	$(P \supset Q)$	Assumed Valid
(2)	$\neg (P \wedge \neg Q)$	Follows from the Validity of (1)
(3)	$\neg P \wedge \neg \neg Q$	Distributive Property
(4)	$\neg P \wedge Q$	Eliminate Double Negation

The following Logic Argument is Proof of the Contrapositive, (i.e., Modus Tollens), that $(P \supset Q) \equiv (\neg Q \supset \neg P)$

(1)	$P \supset Q$	Assumed Valid
(2)	$\neg (P \wedge \neg Q)$	Follows from the Validity of (1)
(3)	$\neg (\neg Q \wedge P)$	Commutative Property
(4)	$\neg \neg Q \wedge \neg P$	Distributive Property
(5)	$Q \wedge \neg P$	Eliminate Double Negation
(6)	$\neg (Q \supset P)$	Follows from Material Implication
(7)	$\neg Q \supset \neg P$	Distributive Property

2. Conditional Proof. Conditional proof is proving the Validity of a Conditional

Proposition. A Conditional Proof takes the form of asserting a Conditional Proposition, then through argument proving that the Antecedent necessarily leads to the Consequent. A Conditional Proof need not show that the Antecedent is true, only that the truth of the Antecedent guarantees the truth of the Consequent. The proof takes the form:

1. P → Q
2. [intervening arguments]
3. Therefore, P → Q.

Note that proving the Conditional Proposition "P → Q" does not require proof that "P" is true or "Q" is true. It only requires proof that whenever "P" is true then "Q" is also true.

3. Indirect Proof. An Indirect Proof establishes that the Premise of an Argument is true by assuming the Negation of the Premise and showing that this assumption leads to a logical Contradiction.[136] The rules of Logic say that if a Premise (or hypothetical assumption) leads to a logical Contradiction, then the Premise (or assumption) is proved to be wrong. Indirect Proof is expressed in Symbolic Logic as "((¬A ⊃ B) ∧ (¬A ⊃ ¬B)) ⊃ A", which says that "if not-A implies B and not-A implies not-B, then A". Indirect Proof is a form of Argument known as "Reductio ad Absurdum" (reduction to absurdity)

K. FALLACIES OF DEDUCTION. A Fallacy is specious reasoning that appears to be valid.[137] An example is the popular mathematical deductive fallacy that purports to prove that 1 = 2. The fallacy occurs because one easily-overlooked step in the proof involves a division by zero, which is not allowed by the mathematical system in common use.[138] The Syllogistic Fallacies discussed in Section VII.B.10 are Fallacies of Deduction. They are joined by the following non-syllogistic Deductive Fallacies.

1. The Fallacy of Affirming the Consequent. Affirming the Consequent is a logical fallacy that occurs when someone concludes that, because "P" implies "Q", therefore "Q" implies "P". The term "Affirming the Consequent" comes from the fact that "the Consequent" in the conditional clause, which is "Q", has been "affirmed," or proven to be true. This Fallacy, also known as Converse Error, stated in Symbolic Logic is:

(1) If P, then Q.		(1) P implies Q.
(2) Q.	or	(2) Q.
(3) Therefore, P.		(3) Therefore, P.

We can put the discussion into the context of cause and effect. Where there are several possible causes of a particular effect, the existence of that effect cannot itself establish which cause is involved. However, knowing the list of causes of a particular effect certainly can be useful in focusing efforts to determine which cause is involved. If a patient exhibits a medical condition that is known to result from certain causes, then the physician knows which causes to rule out or confirm until the particular cause is determined.

The case of *E.I. du Pont de Nemours & Co. v. Robinson*, 923 S.W.2d 549 (Tex. 1995), exemplifies the fallacy of Affirming the Consequent. In this case, the Robinsons sued du Pont, alleging that an adulterant contained in du Pont's Benlate fungicide, that was purchased by the Robinsons and applied to their pecan trees, caused the trees to have chlorosis, a yellowing of the leaves. *Id.* at 559. The Robinsons' expert examined their trees and concluded that the chlorosis resulted from SU herbicides that had inadvertently contaminated the Benlate. The expert claimed that the fact that SU herbicides caused chlorosis had been established by analysis he had conducted prior to being hired in the case. The Robinsons' expert "did not conduct any soil or tissue testing, did not research relevant weather conditions, and did not test any of the

Benlate used by the Robinsons, even though they had one opened box of the fungicide remaining." *Id.* at 551. To put the Robinsons' expert's analysis into syllogistic form: (1) SU herbicides cause chlorosis; (2) the Robinsons' trees exhibited chlorosis; (3) therefore the Benlate the Robinsons applied to their trees was contaminated with SU herbicides. This is like saying: "All men are mortal, Socrates is mortal; therefore, Socrates is a man. Stated as an implication:

(1) P implies Q.
(2) Q.
(3) Therefore, P.

This is Aristotle's fallacy of Affirming the Consequent. Since there are several causes of chlorosis, the existence of chlorosis in and of itself does not establish the particular cause in this particular instance. Additional emperical efforts are required to rule out all other possible causes or to positively confirm one cause. It can also be said that the Robinsons' expert committed the Inductive fallacy of Post Hoc Ergo Propter Hoc (see Section VIII.F.7), since he reasoned that because chlorosis followed application of the Benlate, it therefore must have been caused by application of the Benlate. At best the expert's prior work established SU herbicide as one possible cause of chlorosis, but in the case at hand the expert did not make the effort to empirically rule out other possible causes of chlorosis, and most importantly he did not empirically confirm his conclusion of contamination by chemically analyzing the Robinsons' partially unused Benlate to see if it contained SU herbicide

Although Affirming the Consequent is a logical Fallacy, it can still be a helpful tool in problem-solving. Example: A patient enters the clinic with a body temperature of 100 degrees Farenheit. Possible causes include: recent physical exertion; a recent hot bath; an elevated temperature that is normal for the patient; a microbial infection; a viral infection. The physician must determine the cause in order to determine the best medical response. The physician can narrow the possible causes of the fever by questioning the patient about recent physical exertions or a recent bath, or looking at the patient's chart of prior temperature readings. Even after ruling out these causes, the physician must still choose between a bacterial and a viral infection. If it is flu season and a member of the patient's household has recently been confirmed to have flu, the physician may conclude that it is probable that the elevated temperature results from the flu virus. An antibiotic would therefore be useless and the best advice is to go home, rest, and drink plenty of liquids. This assumption can be conclusively determined several days later when the physician receives a laboratory analysis of a saliva culture from the patient.

2. False Dichotomy. A False Dichotomy reduces a set of possibilities down to a set number (2, 3, or more). The Proposition forces a choice between the stated alternatives. The dichotomy is a False Dichotomy when there are in fact more than the listed choices.

3. Inconsistency. Inconsistency occurs when a set of standards is applied to one argument but not to another argument that should be evaluated on the same basis.

4. Non Sequitur. A Non Sequitur is an argument in which the Conclusion does not follow by necessity from the Premises.

5. Slippery Slope. A "slippery slope" argument attempts to refute a proposition by claiming that acceptance of the Proposition will lead to a series of developments that result in an undesirable outcome.[139] To avoid the undesirable outcome, it is argued that the first step should be rejected. Stated in

symbolic terms, a slippery slope argument takes the form of Modus Tollens:

$A \rightarrow B, B \rightarrow C, C \rightarrow D, D \rightarrow E; \neg E; \therefore \neg A.$

Slippery slope arguments are fallacious whenever the proponent fails to establish that each step of the claimed sequence of events necessarily will occur. Not all slippery slope arguments are fallacious. For example, German theologian Martin Niemöller, who criticized Hitler and was arrested, but survived Sachsenhausen and Dachau, famously said:

"THEY CAME FIRST for the Communists, and I didn't speak up because I wasn't a Communist.
THEN THEY CAME for the trade unionists, and I didn't speak up because I wasn't a trade unionist.
THEN THEY CAME for the Jews, and I didn't speak up because I wasn't a Jew.
THEN THEY CAME for me and by that time no one was left to speak up . . . ."

The implication is that, to avoid their coming for you, you should stand up for the first group they come to take away.

Another slippery slope argument was powerfully stated by Justice Robert Jackson, in *West Virginia State Board of Education v. Barnette*, 319 U.S. 624, 640-41 (1943), the Jehovah's Witness children flag salute case, handed down during World War II, shortly after American and British soldiers pushed the German and Italian armies out of North Africa but before the Allied invasion of Sicily:

> National unity as an end which officials may foster by persuasion and example is not in question. The problem is whether under our Constitution compulsion as here employed is a permissible means for its achievement.
>
> Struggles to coerce uniformity of sentiment in support of some end thought essential to their time and country have been waged by many good as well as by evil men. Nationalism is a relatively recent phenomenon but at other times and places the ends have been racial or territorial security, support of a dynasty or regime, and particular plans for saving souls. As first and moderate methods to attain unity have failed, those bent on its accomplishment must resort to an ever-increasing severity. As governmental pressure toward unity becomes greater, so strife becomes more bitter as to whose unity it shall be. Probably no deeper division of our people could proceed from any provocation than from finding it necessary to choose what doctrine and whose program public educational officials shall compel youth to unite in embracing. Ultimate futility of such attempts to compel coherence is the lesson of every such effort from the Roman drive to stamp out Christianity as a disturber of its pagan unity, the Inquisition, as a means to religious and dynastic unity, the Siberian exiles as a means to Russian unity, down to the fast failing efforts of our present totalitarian enemies. Those who begin coercive elimination of dissent soon find themselves exterminating dissenters. Compulsory unification of opinion achieves only the unanimity of the graveyard.
>
> It seems trite but necessary to say that the First Amendment to our Constitution was designed to avoid these ends by avoiding these beginnings.

Slippery slope arguments have been studied in the legal literature.[140]

6. Begging the Question. "Begging the Question," also called "Circular Reasoning," is an argument in which the proposition assumes the truth of what it purports to prove. Stated differently, it is a proposition that states the conclusion (sometimes in different words) as support for the conclusion. In *Prior Analytics*, Book II, xvi, Aristotle wrote that--

> begging the question is proving what is not self-evident by means of itself... either because predicates which are identical belong to the same subject, or because the same predicate belongs to subjects which are identical.

Example:

Q. Why do you keep snapping your fingers?
A. To keep away elephants.
Q. But there are no elephants around here.
A. That's because I'm snapping my fingers.

7. Circular Reasoning. See "Begging the Question."

8. Changing the Premises. The Fallacy of Changing the Premises occurs when, in the first part of an argument a premise is assumed or proved, and in the second part of the argument another premise is substituted that resembles the first closely enough to be mistaken for it. This can occur when a premise is originally asserted with a qualification, but in the process of making the argument the qualification is forgotten. It can also occur when an unstated limitation or condition is necessary to the truth of the proposition, but is forgotten when that proposition is employed as a premise.[141]

L. PARADOXES. The term "paradox" has been variously defined as: (i) a valid Logic argument that lead to a contradiction; (ii) a seemingly-self-contradictory statement made to arrest attention and provoke fresh thought; (iii) a statement or expression so surprisingly self-contradictory as to provoke us into seeking another sense or context in which it would be true. The root of the word is Greek words meaning "conflicting with expectation." When the paradoxical idea is combined into one term, it is called an "oxymoron." An "epigram" is a short, witty, and often paradoxical statement, like the many Oscar Wilde is remembered for. Paradoxes can arise that are internal to Logic. But paradoxes can also arise from a Sound argument that leads to a Conclusion we know to be false. From a practical perspective, paradoxes are anomolies of language or thought that reflect some problem with the way we are thinking about something. Paradoxes are a small but important part of the history of thinking.

1. The Sorites Paradox. The Sorites Paradox, attributed to Eubulides of Miletes (a pupil of Euclid and teacher of Demosthenes), occurs when the premise of a logic-based argument is sufficiently vague that it "allows for a range of borderline cases in which the truth-value of propositions containing the predicate" cannot be determined.[142] The name "sorites" derives from the ancient Greek word for "heap." In its historically original form, the Paradox of the Heap is:

A grain of sand is not a heap. (Premise 1)
Add to it another grain of sand and it is still not a heap. (Premise 2)
Therefore, adding a grain of sand does not make a heap. (Conclusion)

Take two grains of sand, and add a third. It is still not a heap. Continue the process to infinity and you still have no heap. And yet at a certain point, we know that we have enough sand to make a heap. Thus, the paradox.

The Sorites can be done by subtraction:

1,000,000 grains of sand is a heap (Premise 1)
Remove one grain of and it is still a heap. (Premise 2)
Therefore, removing a grain of sand does not eliminate a heap. (Conclusion)

The process can be repeated until there is no more sand left, and still it is a heap. Thus, the paradox.

Stated in modern terms: "Would you describe a single grain of wheat as a heap? No. Would you describe two grains of wheat as a heap? No. … You must admit the presence of a heap sooner or later, so where do you draw the line?"[143]

You can resolve the nomenclature problem by defining a dividing line, for example that it takes one million grains of sand constitutes a heap. But you would have a hard time justifying why 1,000,000 grains of sand is a heap, but 999,999 is not. The same problem is presented when considering how many hairs to take from an hirsute man before he is bald**.** In some instances, a disputant will retreat to gradations in order to avoid a difficulty arising from a more categorical statement of a proposition.

2. The Liar Paradox. Epimenedes was a poet in ancient Crete who believed that Zeus was immortal, contrary to the view then prevailing in Crete. Epimenedes wrote:

> They fashioned a tomb for thee, O holy and high one.
> The Cretans, always liars, evil beasts, idle bellies!
> But thou art not dead: thou livest and abidest forever,
> For in thee we live and move and have our being.

This sentiment was picked up by the Apostle Paul, who wrote in his Epistle to Titus[144]: "One of themselves, even a prophet of their own, said, the Cretians are always liars, evil beasts, slow bellies. This witness is true." HOLY BIBLE Titus 1:12-13. If Cretans are always liars, then when a Cretan tells you that Cretans are always liars, he must be lying. So Epimenedes' statement that "Cretans are always liars" must itself be a lie, which means that at least one Cretan must be truthful. But that conclusion negates the original assertion that Cretans are always liars. So the assertion negates itself. This form of self-contradiction is called "the Liar Parodox."[145] The paradox could be avoided by moderating the assertion from "always" to "usually," without substantially weakening the point being made.

3. Eubulides's Paradox. The Liar Paradox has been streamlined to the assertion: "this statement is false." If the statement is true, then by its own terms it must be false. However, if the statement is false, then by its own terms the statement must be true. A statement that falsifies itself is sometimes called a "Pragmatic Paradox."

4. Socrates' Paradox. Plato wrote that Socrates said: "One thing I know is that I know nothing." This statement attributed by Plato to Socrates cleverly refutes the skeptics' claim that it is impossible to know anything. The skeptics' assertion, that nothing can be known, itself tacitly asserts certain knowledge of one thing (i.e., that nothing in knowable). Thus, assuming as a premise that nothing can be known leads to a self-contradiction. This is a form of Indirect Proof: since the Premise that nothing can known leads to a logical contradiction, the Premise is disproved, which Validates the opposite of the Premise, and confirms the idea that something is knowable. The statement also demonstrates that a paradox can be a dramatic and effective rhetorical technique.

As an historical aside, Rene Descartes' Axiom "I think; therefore I am", can be viewed in light of Socrates' Paradox. Descartes pursued

his famous "Method" of reasoning, of challenging each of his beliefs by identifying its underlying assumptions and challenging their underlying assumptions, et cetera. Descartes pulled out of an infinite regression when he reached the point of challenging his own existence. To use Socrates's style, the one thing Descartes could not doubt was the fact that he was doubting. He therefore concluded that the mental consciousness doing the doubting must exist. From that he started building a new world view that bequeathed us the philosophical doctrine of dualism, as well as analytic geometry, among other things.

5. Smasandache Paradox. Given "A" as some attribute, if everything is "A", then "¬ A" must be "A". This violates the postulate at the foundation of Aristotle's system of logic, the Law of Contradiction, which says that "A ≠ ¬ A".

6. The Catalog Paradox. A library is compiling a bibliographic catalog of all (and only those) catalogs which do not list themselves. Should the library list its own catalog?

7. The Omnipotent God Paradox. If God is all-powerful, can God make a weight too heavy for even God to lift?

8. The Surprise Test Paradox. In the Surprise Test Paradox, a classroom teacher announces that she will give a surprise test next week.

(1) If the test is not given by Thursday, then the class knows it will be on Friday, and there is no surprise. Therefore, to be a surprise the test must be given before Friday.

(2) If the test is not given by Wednesday, then it must be given on Thursday or Friday. But under (1) we know it can't be Friday or it would not be a surprise test. So the test must be given on Thursday, which would be no surprise at the end of the day on Wednesday. So the test must be given before Thursday.

(3) If the test is not given by Tuesday, then it must be given on Wednesday, Thursday, or Friday, but under (1) and (2) we know that giving the test on Thursday or Friday would not be a surprise. Therefore, the test must be given on Wednesday, which as of the end of Tuesday would not be a surprise.

(4) From (1) through (3) we know that a test given on Wednesday or Thursday or Friday would not be a surprise, which leaves only Monday or Tuesday. If the test is not given on Monday, then it can only be given on Tuesday, so by the end of the day Monday a test given on Tuesday would be no surprise.

(5) Propositions (1) through (4) show that a test given on Tuesday, Wednesday, Thursday, or Friday would not be a surprise, leaving Monday as the only possible day to give the Surprise Test. But once we know that the test must be given on Monday, then a test on Monday would be no surprise.

(6) Therefore, the teacher cannot give a surprise test next week if the fact that the test will be given is announced in advanced.

9. The Grandfather Paradox. The "Grandfather Paradox" is the name given to the idea that, with time travel, it would be possible to go back in time to keep your grandfather from meeting your grandmother, so that you would never have been born. Variations of this idea are found in the plots of short stories, books, and movies (*The Terminator*, *Back to the Future*). This paradox has been used as proof that traveling backward in time is not possible, and has even spawned speculation among physicists about parallel universes, and the like.[146]

10. The Envelope Paradox. The two-envelopes Paradox, an adaptation of a problem posed by a mathematician in 1953, is as follows:

> You are presented with two indistinguishable envelopes containing some money. You are further informed that one of the envelopes contains twice as much money as the other. You may select any one of the envelopes and you will receive the money in the selected envelope. When you have selected one of the envelopes at random but not yet opened it, you get the opportunity to take the other envelope instead. Should you switch to the other envelope?[147]

The paradox is understood in this way:
(1) Call the amount of money in the envelope you selected "A".
(2) The probability that A is the lesser amount is 0.5; the probability it is larger is the same.
(3 Therefore, the other envelope contains either A/2 or 2A.
(4) If A is the lesser, then the other envelope contains 2A. If A is the larger, the other envelope contains A/2.
(5) The probabilities of the other envelope are 0.5 of A/2 and 0.5 of 2A.
(6) The expected value in the other envelope is shown by the following formula:

$\frac{1}{2} \cdot (A/2) + \frac{1}{2} \cdot 2A = 1/4 \cdot A + A = 5/4 \cdot A$.

(7) Since the expected value in the other envelope is 5/4A, which is more than A, you should switch envelopes.
(8) However, once you acquire the other envelope, the same reasoning process would lead you to swap again. This goes on infinitely.

Another way to look at the problem is using "expected values." In the following formula E(A) is the expected value in Envelope A; E(B) is the expected value in Envelope B; X is the lesser amount of money in the two envelopes:

$E(A) = E(B) = 0.5 \cdot (X + (2 \cdot X)) = 1.5 \cdot X.$

Since the expected value of A and B is equal, there is no reason to switch the envelopes.[148]

11. Orsinger's Paradox. A more legally-oriented paradox, hereby dubbed "Orsinger's Paradox," is the following: "All rules have exceptions." If true, then this rule must have exceptions. An exception to this rule would be a rule that has no exceptions. If even one rule has no exceptions, then to say that all rules have exceptions negates itself.

12. A Famous Scientific Paradox. A famous paradox occurred in the scientific understanding of the speed of light in a vacuum. "Velocity" is measured by the change in position of a moving object over an interval in time. The formula is $V = \Delta d \div \Delta t$, stated in words as "velocity equals the change in distance divided by the change in time." Galileo Galilei had suggested that the perception of motion was relative to the observer. So, standing on the earth it appears that the sun moves around the earth, but relative to a stationary position in space it appears that the earth moves around the sun. Take the example of a passenger on a moving train, and an observer on an embankment next to the train track. If a train is moving at 40 mph, and the conductor on the train began to walk from the back to the front of the train at 2 mph, the passenger on the train would see the conductor walking at 2 mph toward the front of the train. However, the observer on the embankment next to the train would see the conductor moving at 42 mph in the direction the train is traveling. Likewise, if the conductor began to walk from the front to the back of the train at 2 mph, a passenger would see the conductor moving rearward at 2 mph, while an observer on the embankment would see the conductor moving backwards at 38

mph in the direction the train is traveling. This example reflects the additive nature of the velocity of someone moving on a moving platform relative to a fixed observer. The perspective of the observer on the embankment can be generalized to an observer who is watching everything move from a stationary location in space. In 1887, Albert Michelson and Edward Morley emitted a light beam that they split into two beams traveling at a 90˚ right angle to each other. They were able to make a precise-enough measure of the velocity of the light beams to determine that the speed of light was the same regardless of the direction in which it was emitted. Since the earth was a "platform" moving at a high speed through the æther of space when the light beam was emitted, the fact that the two light beams exhibited no effect from the earth's motion through the æther created a paradox, in conflict with the prevailing understanding of motion through the æther of space. This paradox left scientists in a quandary until June 30, 1905, when Albert Einstein published his paper on special relativity, which reasserted Gallileo's belief that the perception of motion is relative to the observer. But Einstein went further, theorizing that, if the velocity of light in a vacuum is fixed, then at speeds approaching the speed of light either the change in distance or the change in time must be relative to the observer. He concluded that both space and time are relative. This insight eliminated the paradox by refuting the belief in absolute stationary space that was filled with æther (i.e., there is no "embankment" in space). It also refuted the view that the rate at which time passes is fixed. And it made Einstein justifiably famous.

13. A Famous Political Paradox. On April 27, 1861, President Abraham Lincoln suspended the writ of habeas corpus "at any point on or in the vicinity of any military line, which is now used or which shall be used between the City of Philadelphia and the City of Washington." On September 24, 1862, he expanded the geographical scope of the suspension to include the entire country. As a result, Union military officers arrested and held thousands of citizens in loyal states incommunicado without civilian arrest warrant, grand jury indictment, or trial, for criticizing the war effort. Lincoln was assailed for violating his oath of office by violating the Habeas Corpus Clause of the U.S. Constitution. Lincoln's original suspension of the writ was subjected to methodical and cogent criticism by Chief Justice Roger Taney in his Opinion in *Ex parte Merryman*, 17 F. Cas. 144, 151-152 (C.D. Md. 1861), which stated that Lincoln had usurped a power reserved to Congress, and violated the Fourth, Fifth and Sixth Amendments. Lincoln sent a Message to Congress in Special Session on July 4, 1861, which set out his response to these and other attacks. Lincoln argued that he had implied power as Chief Executive to suspend the writ of habeas corpus in an emergency. In particular, he countered the claim that he had violated the Habeas Corpus Clause by arguing, among other things, that the criticism was paradoxical. Here's what he wrote:

> Soon after the first call for militia it was considered a duty to authorize the commanding general in proper cases according to his discretion, to suspend the privilege of the writ of habeas corpus, or in other words to arrest and detain, without resort to the ordinary processes and forms of law, such individuals as he might deem dangerous to the public safety. This authority has purposely been exercised but very sparingly. Nevertheless the legality and propriety of what has been done under it are questioned and the attention of the country has been called to the proposition that one who is sworn to "take care that the laws be faithfully executed" should not himself violate them. Of course some

> consideration was given to the questions of power and propriety before this matter was acted upon. The whole of the laws which were required to be faithfully executed were being resisted and failing of execution in nearly one-third of the States. Must they be allowed to finally fail of execution, even had it been perfectly clear that by the use of the means necessary to their execution some single law, made in such extreme tenderness of the citizen's liberty that practically it relieves more of the guilty than of the innocent, should to a very limited extent be violated? To state the question more directly, are all the laws but one to go unexecuted and the Government itself go to pieces lest that one be violated? Even in such a case would not the official oath be broken if the Government should be overthrown, when it was believed that disregarding the single law would tend to preserve it?

One of the criticisms Lincoln faced was the argument that the structure of the Constitution and the few historical precedents (involving Presidents Washington and Jefferson) suggested that only Congress could suspend the Writ. It is interesting to note that Lincoln used pronouns and the passive voice in a way that depersonalized his actions and de-emphasized the fact that, in suspending the Writ, he acted alone, as Chief Executive. The argument was mooted when Congress ratified Lincoln's actions. At any rate, the paradox Lincoln proposed was that treating this one constitutional rule as inviolate would lead to the loss of the entire Constitution, the inviolate rule included. The only way out of the paradox was to ignore this one rule (which, he offered in mitigation, mainly benefitted guilty persons anyway). The fallacy in Lincoln's argument was that the estimated 20,000 people whose constitutional rights were abrogated were not in the one-third of the former states that had repudiated the Constitution, but rather in the two-thirds of the states where the Constitution, including the Habeas Corpus Clause, continued to be the rule of law. Thus, the people in rebellion were not arrested, while the people arrested were not in rebellion.[149] Lincoln's argument was a Non Sequitur. Logical considerations aside, Lincoln in essence allowed local military commanders around the Union to sequester and thus silence non-rebelling citizens who peacefully criticized Lincoln's policy of using military force to overturn secession. The issue was ultimately determined after Lincoln's death, in *Ex parte Milligan*, 71 U.S. 2, 127 (1866) (1866 WL 9434), where a 5-to-4 majority of the Supreme Court agreed that the rights ensured by the Bill of Rights could not be abrogated, even in times of insurrection or war, in geographical areas where the civil government and civil justice system were functioning normally.

14. Avoiding "All" or "None." The "Liar Paradox" shows that some propositions refute themselves. This self-refuting quality can usually be eliminated by switching "all" to "most" or switching "all" to "some." This switch avoids self-refutation. This is a special application of a larger rule, that you should avoid stating propositions in absolute terms, where possible. An absolute assertion can be refuted with one counter-example, whereas an assertion using "nearly all" or "most" cannot be refuted without considering all possible instances. Just as people say "never say never," you should *almost never* say "all" and "none."

M. THE IMPORTANCE OF RELEVANCE. For deductive reasoning to be useful it is important that the Premises (or Antecedents) be relevant to the Conclusion (or Consequent). The validity of a Proposition or Logic Argument is measured by a single test, no matter what the Premises and Conclusion might be: a Proposition or Argument is Valid if it is impossible for its Premises all to be true

and the Conclusion to be false.[150] The following Proposition is Valid:

(1) The number 2 is an odd number.
(2) What is black is white.
(3) Therefore, the earth circles the sun.

Since (1) and (2) can never be true, it is impossible for (3) to be false when (1) and (2) are true, so the foregoing Proposition is Valid. Furthermore, because the Premises are true and the Logic is Valid, the Proposition is Sound. But the Premises have no relevance to each other or to the Conclusion. This example is extreme, since the lack of relevance is obvious. However, many Propositions are stated where the Terms appear to be relevant but are not. Since relevance is a subjective assessment, in an argument stated in natural language the correctness of the argument can depend on relevance, which often is "in the eye of the beholder."

Relevance can also be a problem where the two Premises are inconsistent (i.e., so that it would be logically impossible for both Premises to be true at the same time).[151] Since it can never be the case that both Inconsistent Premises can be true, then it will never happen that both Premises are true and this Conclusion false. By definition, then, a Proposition with inconsistent Premises is always Valid, no matter what the Conclusion may be. Example:

(1) Black is white.
(2) White is black.
(3) Therefore, yellow is blue.

This deductive Proposition is Valid, but we know that it makes no sense. In Logic, this Proposition is Unsound (i.e., one or more of the Premises are false). An Unsound Proposition gives no assurance that the Conclusion is true. While Soundness alerts us to a problem when Premises are false, a relevance requirement protects against Premises that are true but not sufficiently related to the issue at hand to result in a reliable Conclusion.

Some logicians have developed systems of Logic that include an additional parameter indicating the degree of relevance between the parts of a Proposition or Argument. Such systems do not involve certainty of the outcome that is required for bivalent Deductive Logic, and are therefore part of Inductive Logic (see Section VII.).

N. THE PROBLEMS OF CONDITIONALS. "Conditionals" are statements involving logical Implication. In natural language, a Conditional Proposition is reflected by clauses like "if . . . then," or "Q because of P." The normal way to discuss conditionals in Logic is to use phrases like "P implies Q," or "P implies not-Q," or "not-P implies Q," or "not-P implies not-Q."

Conditionals can be difficult to deal with, because a Proposition has a Truth Value based on the truth or falsity of the Antecedent and the Consequent. Additionally, either the Antecedent or Consequent or both can be a complicated logical Proposition, including another Conditional Proposition.[152]

1. Problems with the Material Conditional. In Formal Logic, the proposition that "P implies Q" is depicted " $P \supset Q$" or "$P \Rightarrow Q$", and is called the Material Conditional. From the standpoint of Logic, the Material Conditional is considered to be False when P is true and Q is false, but True in all other instances. That means that, in Formal Logic, when P is false then the proposition "$P \supset Q$" is True, regardless of whether Q is true or false. The Truth Table for the Material Conditional is:

P	Q	P ⊃ Q
T	T	T
T	F	F
F	T	T
F	F	T

There are two recognized Paradoxes of Material Implication. The first it that, whenever the Antecedent is false, the Material Implication is True, regardless of whether the Consequent is true or false.

The idea that the Material Conditional is True whenever the Antecedent is false (3rd & 4th Rows) reflects a departure of Logic from the way we intuitively perceive the world. For example, let P stand for the assertion "it is snowing in the Sahara Desert." Let Q stand for the proposition that "Martians landed on the White House lawn". Remember that, with the Material Conditional, "P ⊃ Q" is true whenever P is false, even if Q is false (4th Row). It is logically Valid to say that the fact it is snowing in the Sahara implies that Martians have landed in the nation's capital. If such assertions are logically Valid, then the Material Implication is of little practical use in ordinary discourse in instances where the Antecedent is false.

The foregoing problem has been identified as a lack of relevance between the Antecedent and the Consequent, which some thinkers have tried to eliminate by developing a relevancy requirement in assessing Conditionals.

The second Paradox of Material Implication is that the 1st Row and 3rd Row of the Truth Table for the Material Conditional, taken together, indicate that P ⊃ Q and that ¬P ⊃ Q. Since Aristotle's Law of the Excluded Middle establishes that everything is either P or not-P, then "P ∧ ¬ P" includes everything. If both P and ¬ P imply Q then, when Q is true, everything Materially Implies Q.

Consider the following proof: if P is false, then, based on Aristotle's Law of the Excluded Middle, ¬ P must be true. Using the Truth Table for the Material Conditional, substituting ¬ P in the 3rd Row, where P is false, results in the logically-Equivalent proposition "¬ P ⊃ Q" being True. Substituting ¬ P for P, when P is false, and substituting ¬ Q for Q, when Q is false (4th Row), results in the proposition "¬ P ⊃ ¬ Q" being True (4th Row). Thus, the 3rd and 4th Rows together indicate that (¬ P ⊃ Q) ∧ (¬ P ⊃ ¬ Q). This is logically Equivalent to ¬ P ⊃ (Q ∧ ¬ Q). Since (Q ∧ ¬ Q) includes everything, ¬ P, when used in the Material Conditional, implies everything. Thus, the Material Conditional with a false Antecedent cannot be used to differentiate anything from anything else, which makes it useless, except as a topic of endless discussion among philosophy graduate students.

These problems result from the fact that Formal Logic operates in the abstract, while what "makes sense" to us involves our language, our experience, our habits, and of course the real world. We are again led to the recognition that what is logically Valid may not be Sound.

Consider the Material Conditional "P ⊃ P". If the Premise is true, then the Consequent is true, and the Material Conditional is both Valid and Sound, but it is a Tautology. Consider the Material Conditional "P ⊃ ¬ P". If the Premise is true, then the Consequent is false, which makes the Material Conditional Invalid and therefore Unsound. If the Antecedent is false, then the Consequent is true, which makes this Material Conditional Valid but Unsound.

2. Problems With the Indicative Conditional. An indicative Conditional uses

a verb (the Copula) that is in the indicative mood. The indicative mood conveys a strong belief that the Consequent follows from the Antecedent. Example: "If Mary is late, that means that she got caught in traffic." An indicative Conditional may be "truth preserving" (if the Terms are true then the entire Proposition is True), or may not, depending on how it is used.

The indicative mood reveals less information than a subjunctive Conditional, according to a paper coauthored by British psychologist Ruth M.J. Byrne, which gave two examples:[153]

> If John wore a seatbelt then his injuries were slight. (Example 1)
> If John had worn a seatbelt then his injuries would have been slight. (Example 2)

Example 1 is an indicative Conditional while Example 2 is a subjunctive Conditional. Byrne believes that Example 1 does not suggest whether John wore a seatbelt, while Example 2 suggests he did not. This suggests that the mood of the verb contained in a Conditional can affect the way it will be interpreted.

3. Problems With Subjunctive Conditionals. A subjunctive Conditional is a Conditional stated in the subjunctive mood. The subjunctive mood is used in English to suggest that the things described are not true, or might not be true. In her paper mentioned above, Byrne asserts that "[u]nless the content, context, or general knowledge suggests the contrary, conditionals in the subjunctive mood, such as Example 2, convey information about the truth status of their antecedents and consequents, unlike conditionals in the indicative mood, such as Example 1."[154] Some philosophers have attempted to evaluate subjunctive Conditionals in terms of "possible worlds" that could exist. They distinguish between propositions that are true (true in the real world), false (untrue in the real world), possible (true in at least one possible world), contingently true or false (true in some possible worlds and false in others), necessary (true in all possible worlds), and impossible (false in all possible worlds).

4. Problems With Counterfactual Conditionals. A "Counterfactual Conditional" is a conditional statement whose antecedent is known to be false. Some counterfactual Conditionals can be said to be correct or incorrect. In the following two examples, assume Jean is in Geneva, Switzerland:

> If Jean were at the Louvre, he would be in North America. (Example 3)
> If Jean were at Chichen Itza, he would be in North America. (Example 4)

Although these two Conditionals are counterfactual (because Jean is in Geneva, that can be said to be wrong or right. Example 3 is always wrong, and Example 4 is always right, no matter where Jean might be.

Other counterfactual Conditionals cannot be said to be correct or incorrect, such as: "If Napoleon had not invaded Russia, he would have died the Emperor of France." There is no way to know, even absent the War of 1812, whether England could have persuaded and paid Austria and Russia to invade France and whether such an invasion, if attempted, would have been successful. Or as Napoleon aged, he could have suffered dementia, become mentally incompetent, and been removed by a coup d'etat prior to his death.

Reasoning from counterfactual Conditionals requires the reasoner to imagine a Premise that the reasoner knows is not true. Some psychologists suggest that reasoning from counterfactuals requires reasoning procedures that are an extension of the reasoning used for

normal Conditionals.[155] One difficulty of counterfactual Conditionals is to evaluate possible worlds that might have resulted had the counterfactual Conditional occurred. From a Truth Value perspective, counterfactual Conditionals are always True because the Antecedent is false. See Section VII.N.1 & 4.

O. "SOME" and "ALL." Lincoln's famous statement, "you can fool some of the people all of the time, and all of the people some of the time, but you can't fool all of the people all of the time," can be expressed symbolically ("F" is a situation in which the people are fooled, "P" is people, and "T" is time): $F(\exists P, \forall T), (\forall P, \exists T), \neg F(\forall P, \forall T)$. See Section VII.B.7. A separate point is that it can be considerably more difficult to prove, and thus easier to refute, Propositions that use "all" as opposed to "some." The Liar Paradox mentioned in Section VII.L.2 above can be eliminated by using the quantifier "some" instead of "all": "Some Cretians are liars." Most "all" statements can be rewritten as "some" statements and still accomplish the required purpose.

P. PROBABILITIES. From a practical perspective, if we know that the Proposition "P implies Q" is Valid, then when P is true Q must therefore be true. This is the rule of Modus Ponens. And if "P implies Q" is Valid, and Q is untrue, then we know that P must be untrue. This is the rule of Modus Tollens. But what if the Validity of the Proposition "P implies Q" is not a given, but instead is a hypothesis that needs to be proven. We might be able to deductively Validate the Implication "P implies Q" by constructing a logical Argument using Propositions that have been proven Valid, or Axioms (i.e., Premises that are assumed to be true), to prove that the Proposition "P implies Q" is Valid. Where this is not possible, then we can only hope to prove that "P implies Q" by making observations or conducting experiments to see whether *any*, and eventually *every*, instance of P is accompanied by an instance of Q. If every instance of P is accompanied by an instance of Q, then the Proposition "P implies Q" is Valid. If we find a single instance where Q does not accompany P, then we have shown that the proposition "P implies Q" is Invalid.

What if P *sometimes* implies Q, but not always? This forces us into a less certain domain, where the best we can do is ascertain the likelihood that P implies Q. We thus move from the domain of certainty (and Deductive Logic) to the domain of probability (and Inductive Logic). After many observations, or many experiments, the statistician may be able to say, for example, that P implies Q 80% of the time. Stated differently, there is an 80% probability that P implies Q.

Some of the choices we face in our lives involve certainties, where a particular action (or inaction) will always lead to a certain result. For example, if you don't buy a lottery ticket, your chances of winning the lottery are zero (but if you do buy a lottery ticket, your odds of winning the Texas Lotto lottery are nearly zero–around 1-in-26 million). But many of the choices we face do not lead with certainty to a particular result. Sometimes we may be contemplating a choice where scientists or statisticians have calculated the probability of different outcomes. More often in life and business we are faced with choices where the probability of various outcomes has never been determined. Then we fall back on generalities, saying for example that a certain outcome is highly likely, or more likely than not, or unlikely.

The burden of persuasion in a trial can be viewed in this light. Where the burden of persuasion is a preponderance of the evidence, the question for the jury is whether a proposition is more likely than not (stated legally, supported by the "greater weight of credible evidence"). Where the burden of persuasion is clear and convincing evidence,

the question for the jury is whether a proposition is highly likely (stated legally, where the jury has "a firm belief or conviction" that the proposition is true). Where the burden of proof is beyond a reasonable doubt, the question for the jury is whether all reasonable explanations other than guilt have been eliminated (there is no "official" definition of reasonable doubt).

Logical Propositions involving probabilities are the domain of Inductive Logic. See Section X.

Q. TRANSLATING ENGLISH TO DEDUCTIVE LOGIC. In many instances, logical propositions embedded in English sentences are so obvious that the deductive validity or invalidity of the argument is readily apparent. In other instances, the logic underlying an argument is not evident, and whether the logic is valid or invalid is more difficult to discern. It is therefore sometimes helpful to translate English language arguments into the language of Logic, to make the logical propositions underlying the argument more evident. Here are some techniques to make this translation from natural language to easier.

1. Negation. The word "not," in grammatical usage, indicates that the statement immediately following the "not" is false (or does not apply). English words that correlate to Logical Negation include "not," "neither . . . nor," "never," "none," "isn't," and "cannot be." Negation in English can also be indicated by prefixes such as "un-," as in "untimely," "unjustified," etc. In Formal Logic, which is bivalent and therefore recognizes that a statement has only two values (True or False), Negation converts the Truth Value of a Logical Statement or Logic Proposition from True to False or from False to True.

2. Logical Conjunction. The word "and" is, in grammatical usage, a conjunction that joins two words, phrases, or sentences. The word "and" often translates to the Logic Connector "And," symbolized as "/\". Other words that often translate to Logical Conjunction are "but," "moreover," "however," "although," and "even though." Examples:

• It was a dark and stormy night	dark /\ stormy /\ night
• A day late and a dollar short	day late /\ dollar short
• Be on time and ready to go	on time /\ ready to go

Not all English language usages of the word "and" translate to Logical Conjunction. In these instances, the English language statement has no assignable Truth Values. Examples:

- Two and two equals four.
- Isaac and Ishmael were half-brothers.
- Dr. and Mrs. Marcus Welby.
- Proctor and Gamble.

Example of Logical Conjunction in Law: Tex. R. App. P. 33.1 provides:

> (a) *In General.* As a prerequisite to presenting a complaint for appellate review, the record must show that:
>
> > (1) the complaint was made to the trial court by a timely request, objection, or motion that:
> >
> > > (A) stated the grounds for the ruling that the complaining party sought from the trial court with sufficient specificity to make the trial court aware of the complaint, unless the specific grounds were apparent from the context; **and**
> > >
> > > (B) complied with the requirements of the Texas Rules of Civil or

> Criminal Evidence or the Texas Rules of Civil or Appellate Procedure; **and**
>
> (2) the trial court:
>
> (A) ruled on the request, objection, or motion, either expressly or implicitly; **or**
> (B) refused to rule on the request, objection, or motion, and the complaining party objected to the refusal. [Emphasis added].

Considering TRAP 33.1 to be a Logic Proposition that is either True or False, subparts (1) and (2) are conjunctively joined, meaning that both must be true for TRAP 33.1(a) to be True. Sub-subparts (1)(A) and (1)(B) are conjunctively joined, meaning that both must be true for subpart (1) to be True. However, sub-subparts (2)(A) and (2)(B) are disjunctively joined, meaning that subpart 2 is True if either (2)(A) or (2)(B) is true. The disjunction in question is an Exclusive Disjunction, as explained in Section VII.Q.3 below.

3. Logical Disjunction. The word "or," when used grammatically, often signals Logical Disjunction. Logical Disjunction can be either Inclusive or Exclusive.

a. Inclusive Disjunction. Inclusive Disjunction is specified by the phrase "either. . . or . . . , or both." The Statement is True if either A is true or B is true or both are True; the statement is False only when both A and B are false. Often in natural language sentences, the Statement does not specify "or both," and the reader must use the context of the argument or surrounding circumstances to ascertain whether the Inclusive Disjunction is suggested.

b. Exclusive Disjunction. Exclusive Disjunction is specified by the phrase "either. . . or . . . , but not both." The Statement is True if A is true or B is true; the Statement is False is both A and B are true or both A and B are False. Often in natural language sentences, the Statement does not specify "but not both," and the reader must use the context of the argument or surrounding circumstances to ascertain whether the Exclusive Disjunction is suggested.

4. Implication. Some implications stated in English language sentences can be translated into Truth-Functional, Bivalent Logic, and some cannot. When they can, they translate into the Material Conditional. See Section VII.C.3. The Material Conditional is sometimes not useful in analyzing English language statements because of the Paradoxes of the Material Conditional. See Section VII.N.1.

a. Material Conditional. The Material Conditional describes a logical proposition such that when the Antecedent is true the Consequent must also be true (Modus Ponens). The Material Conditional also indicates that, when the Consequent is false, the Antecedent must therefore be false (Modus Tollens).

In Natural Language	In Logic
(1) If you heat water to 210° F, it will boil	210° ⊃ boil (Modus Ponens)
(2) Water boils at 210° F	210° ⊃ boil (Modus Ponens)
(3) You must heat water to 210° F for it to boil	210° ⊃ boil (Modus Ponens)
(4) Water will not boil at less than 210° F	210° ⊃ boil (Modus Tollens)
(5) If it is raining, then the sidewalk will be wet	rain ⊃ wet walk (Modus Ponens)

(6) If the sidewalk is dry, then it is not raining | rain ⊃ wet walk (Modus Tollens)

Note that the Modus Tollens of "rain ⊃ wet walk" is the Logic Equivalent of the Modus Ponens of "dry walk ⊃ not rain".

b. Other Conditionals. Implication can be expressed in the English language in many ways that do not translate to the Material Conditional. For example, the statement "If you finish your homework in time, you can watch your favorite television program" has no Truth Value. Most speakers tacitly require a degree of relevance between the Antecedent and the Consequent before they make a conditional statement, which helps to avoid the Paradoxes of Material Implication discussed in SectionVII.N.1.

Conditional statements may not reflect implication at all. The phrase "B only if A" signifies that A is a necessary condition for B to occur, but does not mean that B necessarily follows from A. For example, Texas Probate Code § 694K says the following:

> 694K. Attorney Retained on Ward's Behalf
>
> (a) A ward may retain an attorney for a proceeding involving the complete restoration of the ward's capacity or modification of the ward's guardianship.
>
> (b) The court may order that compensation for services provided by an attorney retained under this section be paid from funds in the ward's estate only if the court finds that the attorney had a good-faith belief that the ward had the capacity necessary to retain the attorney's services.

This means that before a court can compensate a retained attorney from a ward's estate, the court must first find that the attorney had a good faith belief that the ward was competent. In other words, the award of fees is contingent on the good faith belief. However, the court is not required to award fees, just because good faith belief existed. So the "only if" proposition expressed in Section 694K states a conditional but not an implication.

5. Premise Indicators/Conclusion Indicators. In translating natural language arguments into logic, it is important to identify the premises and the conclusions. Words that indicate a premise include "if," "since," "for," "because," "given that," "for the reason that," "seeing that," "based on the fact that," "on account of," and "in light of the fact that". Conclusion indicators include "therefore," "thus," "hence," "consequently," "so we conclude," "so," "it follows that," "accordingly," "implies that," "it is likely that," and "then" where paired with an "if".[156] Words that signify a conditional statement include "if," "only if," "given that," "provided that," "supporting that," "implies," "even if," and "in case."

6. Identifying and Adding Suppressed Premises. When natural language arguments are made with suppressed premises, it is desirable to indentify these suppressed premises and to make them explicit.

7. Examples of English-to-Logic Translations. In the following examples, the Premise or Antecedent is marked by a [1] and the Conclusion or Consequent by a [2]:

▸[2] "Opportunity is missed by most people because [1] it is dressed in overalls and looks like work," Thomas A. Edison. Edison is saying that success results from hard work and not luck.

▸"'I have always been fond of the West African proverb: [1] 'Speak softly and carry a

big stick; [2] you will go far.'" Theodore Roosevelt

‣[2] The sidewalk is wet, so [1] it must have rained last night.

‣[1] You should finish high school [2] so you can get a better job.

‣[1] If I don't set the alarm clock, [2] I won't get to work on time.

‣[1] Given that Luna failed to attack each independent ground listed in Stripes's motion for summary judgment, [2] she cannot prevail on appeal.

‣[1] The State has not met its burden to establish that the letter is untrustworthy. See id. ("The party opposing the admission of the report has the burden of proving the report's untrustworthiness."); Moss, 933 F.2d at 1307-08. We therefore conclude that [2] the trial court did not err in overruling the State's hearsay objection to the letter.

‣Even though [1] the trial judge erred by overruling Pearson's motion to modify based on its failure to meet the requirements of section 156.401, we nevertheless conclude that [2] the trial court did not err by overruling the motion.

‣ Here, the trial court concluded that the lease was ambiguous as to whom the tenant was; the court determined that the tenant was either "Paul Avenell, Individually and DBA K & S Contracting" or "K & S Contracting, Inc." However, [1] we see nothing in the contract to indicate that Avenell entered into the lease agreement on behalf of "K & S Contracting, Inc." Instead, each time his name is included in the contract, it is associated with "K & S Contracting." . . . Thus, we conclude that [2] the lease is unambiguous and that K & S Contracting is the tenant.

‣ In sum, although we disagree with the trial court's legal conclusion that [1]the lease is ambiguous, we agree [2] that Avenell, individually, is liable under the lease. [This example reflects that the Premise adopted by the trial court was false, but the trial court's Conclusion was nonetheless correct for a different reason].

‣ Because [1] we have concluded that the trial court did not err in refusing to grant a continuance, we further conclude that [2] the trial court did not err in refusing to grant appellant a new trial based on evidence that appellant was harmed by the denial of his motions for continuance.

‣ In his fourth issue, Turner contends that the evidence was legally insufficient to support his conviction because the State failed to prove that he was a primary actor to the offense.FN2 Turner's entire argument on this point is based upon the premise that the jury charge did not authorize the jury to convict him under the law of parties. . . . Contrary to his arguments on appeal, [1] the jury charge also authorized the jury to convict Turner of capital murder or felony murder on a conspiracy theory, as contemplated by Section 7.02(b) of the Penal Code. As discussed below, [2] the evidence was sufficient to convict Turner of capital murder under this theory of responsibility.

‣ [1] Based on this statute, the Rizzos argue that the rollback taxes must have been assessed due to Ancira's change in use of the property, as they were assessed for years during which Ancira owned the land. This argument, however, rests on a faulty premise. The fact that the tax code lays out the proper procedures for a certain task does not guarantee that the procedures were followed in any given case. Accordingly, [2] the fact that the tax code indicates that rollback taxes should only be assessed due to a change in use of property does not compel the conclusion

that, in this case, the taxes were assessed for that reason. The Rizzos' arguments on appeal consequently lack merit.

8. Hypothetical Arguments. Hypothetical arguments make a temporary assumption for purposes of the argument in order to show the conclusion that would follow from the assumption. It is not necessary that the assumption be true. In fact, in an Indirect Argument you assume a hypothesis with the purpose of showing that it is false because it leads to a contradiction.

R. LEGAL FORMALISM. Legal formalism describes a view that the law consists of rules, and that cases consist of facts, and that legal disputes can be resolved by applying the correct rule to the facts. This approach to legal problem-solving lends itself to the Syllogism of Deductive Logic, where the legal rule is the Major Premise, the facts of the case the Minor Premise, and the legal result is the Conclusion that necessarily follows.[157] Cut-and-dried cases may fit into this mold, where the applicable rule of law is clear and the only question is whether the facts of the case fall within the rule. More complex cases, often called "hard cases," do not easily fit within this mold. When there is no clearly-applicable rule of law, the rule to be applied may have to be arrived at using Inductive Logic (see Section VIII) or Reasoning by Analogy (see Section XI).

S. LEGAL EXAMPLES. Some court decisions reflect deductive reasoning, where the Major Premise is a legal principle, the Minor Premise a new case that is held to come within the scope of that legal principle, leading to the result.

Take, as an example, the rules for disqualification of a Texas judge. The grounds for disqualification are set out in Texas Constitution art. V, § 1, and in Tex. R. Civ. P. 18(b)(1). If the judge is related to a party within the third degree of affinity or consanguinity, s/he is disqualified. It is clear what law applies and it is clear how that law applies. The only question is whether the facts of the case fall within the scope of the rule. If so, then the judge is disqualified. If not, then the judge is not disqualified.

A more complicated example involves the enforceability of premarital agreements under Texas law. Under Texas Family Code Section 4.006, a premarital agreement is enforceable unless the party opposing enforcement establishes the defenses of lack of voluntariness or unconscionability. In a Truth Table, the premarital agreement is enforceable unless "not voluntary" (¬V) is found to be true, or "unconscionability" is found to be true. In the following Truth Table, the headings are constructed to reflect the proposition that the party opposing enforcement must prove in order to defeat the agreement (involuntary is "not-V", unconscionable is "U", and enforceable is "E"):

Defenses to Enforcement of
Premarital Agreement:
Voluntariness and Unconscionability

¬ V	U	E
T	T	F
T	F	F
F	T	F
F	F	T

The Truth Table for enforceability of a premarital agreement reads like this:

(1st row) If "not voluntary" is true and "unconscionable" is true, then the agreement is unenforceable.

(2nd row) If "not voluntary" is true and "unconscionable" is false, then the agreement is unenforceable.

(3rd row) If "not voluntary" is false and "unconscionable" is true, then the agreement is unenforceable.

(4th row) If "not voluntary" is false and "unconscionable" is false, then the agreement is enforceable.

The unconscionability defense is a bit more complicated. Even if the premarital agreement is unconscionable, it is nonetheless enforceable unless the party opposing enforcement proves that, before the agreement was signed: (i) s/he was not provided a fair and reasonable disclosure of property or financial obligations of the other party. (ii) s/he did not expressly waive, in writing, such disclosure; and (iii) s/he did not have, or reasonably could not have had, adequate knowledge of the property and financial obligations of the other party. Tex. Fam. Code § 4.006(a)(2). Stated in symbolic logic, where q = unconscionable, r = disclosure, s = waiver, and t = knowledge, to succeed with an unconscionability defense the party opposing enforcement must prove:

$$q \wedge \neg r \wedge \neg s \wedge \neg t.$$

Here is the Truth Table reflecting the unconscionability defense:

Truth Table for the unconsionability defense to enforcement of premarital agreement

q Unc	¬ r Disclosure	¬ s Waiver	¬ t Knowledge	Unenforcable
T	T	T	T	T
T	T	T	F	F
T	T	F	T	F
T	T	F	F	F
T	F	T	T	F
T	F	T	F	F
T	F	F	T	F
T	F	F	F	F

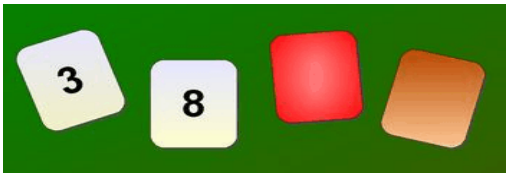
T. COGNITIVE STUDIES OF DEDUCTIVE REASONING. Cognitive scientists have studied the way people engage in deductive thinking, through Syllogisms, Conditionals and in other ways. These scientists have attempted to correlate the difficulty of certain mental processes with objective measures such as reading times, answer times, and percentage of correct answers. Some psychologists believe that persons untrained in Logic use mental rules in a process to derive Conclusions from Premises. Other psychologists reject that idea, saying that logical propositions are valid or invalid based on *form*, while natural language sentences are judged by many persons to be true or false based on *content*.[158] One school of thinking is that persons solve logic problems by constructing "mental models" of the problem, then quickly checking to see if the conclusion holds true in all instances (and is thus "necessary"), or most instances (and is thus "probable"), or at least one instance (and is thus "possible"), or no instances (making the Proposition "Invalid"). Invalidity can be modeled as a search for a counter-example, and if none is found then the Syllogism is deemed valid; if a counter example is found, then the Syllogism is deemed Invalid.[159]

U. REASONING EXPERIMENTS. The typical reasoning experiment provides the participant with a Premise and asks him/her to a produce or evaluate a Conclusion that would follow from the Premise. The psychologist limits the non-logical content of the problem, in order to avoid interference from general knowledge.[160]

1. Tests of Conditional Reasoning. The typical reasoning experiment provides the participant with a Premise and asks him/her to produce or evaluate a Conclusion that necessarily follows from the Premise. The psychologist limits the non-logical content of the problem, in order to avoid interference from general knowledge.[161] In general terms,

most people, when given the indicative Conditional in Modus Ponens form that "P implies Q," and given the Premise "P", arrive at the Conclusion "Q". Only half of the people arrive at the Modus Tollens result, that the Indicative Conditional "P implies Q," together with the Premise "not-Q", leads to the Conclusion "not-P".

a. The Wason Selection Task. A famous test of deductive reasoning was devised by Peter C. Wason in 1966, called the "Wason Selection Task." In this task, the examinee is shown four cards, one with the number 3, another with the number 8, another purely red, and the last purely brown. The examinee was asked, "Which card(s) should you turn over to test the truth of the proposition that if a card shows an even number on its face, then its opposite face is red?"



The answer to the Wason Selection Task is at this endnote.[162] In Wason's study, less than ten percent of the people got the right answer. The experiment suggests that in solving problems people use something other than analytic processes. Some say they use "rules of thumb" or short-cut ways of evaluating problems--which psychologists call "heuristics."[163] Other say that people determine the validity of a deductive proposition by creating "mental models" of the problem, then running through the outcomes to see whether a counter-example occurs. If not, the problem is deemed valid.[164]

Subsequent studies suggest that people not trained in Logic assess the validity of a Syllogism based on the believability of its content. For example, an experiment published in 1983 found that most participants saw that the following Syllogism was incorrect: "No police dogs are vicious; some highly trained dogs are vicious; therefore some police dogs are not highly trained."[165]

VIII. INDUCTIVE LOGIC. In addition to describing reasoning by deduction, Aristotle also wrote about induction (epagôgê). In his writings on Logic, Aristotle says little more than that induction is reasoning from the particular to the general. In his writings on science, however, Aristotle describes induction as a process in which an observer evaluates many specific instances and draws from them underlying principles that connect these specific instances in a necessary way. This has become an idealized view of the scientific process, in which the scientist objectively makes many observations, then uses intuitive processes to abstract from all these instances some underlying principle that explains how or why they occur. This principle is then published as a hypothesis, which is subjected to analysis and testing by other scientists. More generally, people use inductive reasoning every time they use what they already know to deal with novel situations.[166]

The hallmark of Inductive Logic is that the conclusion does not *necessarily* follow from the premises. An Inductive inference or Argument is "strong" if it is *improbable* that the Conclusion is false when the Premises are true. In many instances, it is possible to estimate the likelihood that the Conclusion follows from the Premises using probability theory. Thus, probabilities play an important role in Inductive Logic. Probabilities can sometimes be generated using the principles of statistical analysis. Statistics can be used to extrapolate from a few instances to all instances. Statistics can be used to predict future outcomes or conditions based on past or present circumstances. Generating conclusions using probabilities and statistics can thus be evaluated using the principles of Inductive Logic.

A. MODERN SCIENCE AS INDUCTIVE LOGIC. The philosophy of science has gone through many stages. The current view of modern science, seeded with the writings of Francis Bacon (1561-1626) and the observational work and philosophical writings of Galileo Galilei (1564-1642), is a process of gathering observations about nature and natural phenomena, and drawing from these observations certain underlying principles that are posed as hypotheses that are thereafter tested for validity, and are adjusted or abandoned as further efforts confirm or discredit the hypotheses. The process of drawing underlying principles from many examples is Inductive Logic.

The Inductive Logic component of modern science is epitomized by the work of Galileo Galilei, who drew on his own careful observations of physical phenomena to propose theories about the way the world works. Galileo's measurements regarding the speed of balls rolling down an inclined plane led him to propose that falling objects of different weights all gain speed at the same rate of acceleration. Using a telescope that he developed, Galileo discovered that Jupiter had three moons, and that Venus went through phases like the moon. Both observations destroyed the central tenet of the geocentric view of the universe, that all celestial objects moved around the earth which remained motionless. In a similar manner, Keppler determined his Three Laws of Planetary Motion from astronomical data collected by Tycho Brahe, and Newton developed his explanation of optics from careful observation of the properties of light. Einstein deduced, in Modus Tollens fashion, that experimental evidence, showing that the speed of light was invariable in a vacuum, refuted the traditional assumptions that space and time were invariable, and he inductively generated his Theories of Special and General Relativity as a result.

B. JOHN STUART MILL ON INDUCTIVE LOGIC. John Stuart Mill's 1843 book, A SYSTEM OF LOGIC, contains an important analysis of Inductive Logic. Mill believed that all knowledge derived from experience, and that the rules of mathematics and rules of Logic were drawn by humans from their interactions with the world. In fact, Mill saw Deductive Logic as deriving from Inductive Logic, in that the Premises asserted in Deductive Logic were themselves an extrapolation of general principles drawn from many individual experiences. For example, the Premise "All men are mortal" can be asserted as a Premise derived from our experience that, in every case we have seen so far, all human beings eventually die.

Mill described Inductive Logic in these words:

> Induction, then, is that operation of the mind, by which we infer that what we know to be true in a particular case or cases, will be true in all cases which resemble the former in certain assignable respects. In other words, Induction is the process by which we conclude that what is true of certain individuals of a class is true of the whole class, or that what is true at certain times will be true in similar circumstances at all times.[167]

Mill's approach to inductive reasoning is most readily applied to scientific inquiry about the world, which is not surprising given Mill's thesis that the methods of logical analysis are themselves a product of our observations about the way the world works. Mill's inductive techniques are thus adapted to the development of hypotheses about the cause of events or phenomena in the natural world, which can be validated or invalidated by observations of natural phenomena, or more effectively by conducting experiments in which possible causal agents are isolated and then varied to see how they affect the result.

Mill extended his theories to purely social questions such as morality, but Mill believed that the only "social science" that was truly susceptible to this type of verification was psychology, where concrete rules of human behavior could be identified and tested to establish validity.

Unfortunately, Mill did not apply his thinking to jurisprudence, so we are left to our own devices in applying his model of inductive reasoning to the legal process. Nevertheless, it is apparent that the inductive process outlined with great specificity by Mill does describe some aspects of legal analysis. Applying Mill's insight to the common law, all principles of law, described by Blackstone as deriving from Natural Law, are inductive conclusions drawn from a multiplicity of court rulings that in turn were originally drawn from the way people naturally acted in various circumstances. When no existing rule of law fits the case, and a new rule must be abstracted from a variety of possible rules that might be extended to the case at hand, Inductive Logic comes into play. In that respect, it is probably fortunate that courts of last resort are inclined to allow extensions of the law to develop at the intermediate appellate court level before these "supreme" courts foreclose more exploration by pronouncing the law and thus precluding further inquiry about what the law should be.

C. PRINCIPLES OF INDUCTIVE LOGIC. Since Inductive Logic starts with Premises and ends with a Conclusion, inductive arguments have features that exist for Deductive Logic, except for the certainty in outcome. Looked at syllogistically, Inductive Logic involves inferring the Major Premise of a Syllogism of which the Minor Premise is assumed to be true and the Conclusion is proved to be true.[168]

1. Generalization. A key aspect of Inductive Logic is generalization. There are two types of generalization: Anecdotal Generalization and Statistical Generalization. Anecdotal Generalization proceeds from anecdotes, which are informal accounts of events that cannot be investigated using the scientific method. Anecdotal evidence is not necessarily typical, so the risk is great that someone will make an unwarranted assumption that the anecdote is representative of the general case. This is called the Fallacy of Hasty Generalization (see Section VIII.F.1). A Statistical Generalization is a generalization that attributes to a larger group a property that exists in a representative sample of the target population, typically expressed as a percentage.[169]

2. Simple Induction. Simple induction involves inferring generalized knowledge from example observations. Stated differently, induction is deriving a general rule from background knowledge and observations. Example:

Socrates is a man.
Socrates is mortal.
Therefore, I hypothesize that all men are mortal.

If induction is used to generate a hypothesis, and that hypothesis is confirmed as true, it can become a Premise to use in Deductive Logic (like "all men are mortal").

3. Correlation and Causation. An important part of Inductive Logic is to identify causes, whether of events, or conditions, or diseases, or anything else. A major problem in Inductive Logic is thinking that things that correlate have a causal relationship. Consequently, a dictum has developed that "correlation does not imply causation," meaning that correlation may suggest a causal relationship but it does not prove it. Two things may correlate because they are both responding to a third cause.

4. Statistical Syllogism. A statistical Syllogism is a Syllogism that does not assert the Conclusion with certainty. A statistical Syllogism reasons from a generalization that is for the most part true in a particular case. This contrasts with Induction, which reasons from particular cases to generalizations. Statistical Syllogisms may use qualifying words like "most", "frequently", "almost never", "rarely", etc., or may have a statistical generalization as one or both of their premises. A statistical syllogism has the form: "This is an A and the probability of an A being a B is high, so this is probably also a B."[170]

5. Statistical Prediction. Statistical prediction is predicting outcomes based on broad statistics and not on individual assessment of a specific situation. American psychologist Paul Meehl long championed the idea that the course of mental illness could be better predicted using general statistics than clinical evaluation of the individual patient.[1]

D. COGNITIVE STUDIES OF INDUCTIVE REASONING. Psychologists have been studying the way people engage in inductive reasoning. Interesting conclusions are developing from these studies. In one experiment, examiners were asked to rate an argument that a drug was safe, based on clinical trials that showed no negative side-effects. The examinees rated the conclusion based on one drug study to be weaker than the same conclusion based on 50 clinical trials.[171]

Neuro-scientists have begin to study the physical manifestations of different types of logical thinking using brain imaging tools like the functional MRI. The process is called "neuro-imaging."[172] Studies are showing that performing different types of tasks using inductive logic involves different parts of the brain. It is possible that eventually science will help rhetoricians to refine their theories or develop new ones based on a more accurate understanding of the way the brain works.

E. GENERATING RULES TO RESOLVE LEGAL CASES. In many legal disputes, the law to be applied is not contested. The only issue is how the legal rule applies to the facts of the case. However, in some instances there is a dispute as to which rule of law applies to a case. This occurs when the facts make a case uniquely different from earlier cases or when, in a developing area of the law, the controlling legal principles have not yet been firmly established. In that situation, it is necessary for a judge or lawyer to use legal reasoning to determine the rule of law to be applied. The *first* and most frequent approach is to look at prior cases involving similar issues and argue for or against applying the rule of law of an earlier case to the current case, based on similarities and distinctions between the two cases. If there are no prior cases that are sufficiently similar to copy, then the *second* approach is to look at prior cases in other areas of the law, to see if an underlying rule of law can be discerned that could be used to resolve the case at hand. If the comparison is to be made to rules of law in other areas (rather than specific cases), then the goal is to see if these different rules can be unified as expressions of a more fundamental underlying principle of law that can be applied to the current case. If this is not possible, then as a *third* alternative the lawyers and judges must fall back on general principles of law, to fashion from them a particular application that can be applied to the case at hand.

The first method mentioned above has been identified as "reasoning by analogy." Mill considered reasoning by analogy to be a form

[1]Meehl's 1954 book [Sc] Clinical v. Statistical Prediction: A Theoretical Analysis and a Review of the Evidence [Sc] that statistics about great numbers of mental health products had better predictive ability for the individual patient than clinical judgments about the patient made by the patient's treating professionals.

of inductive reasoning. Others have argued that reasoning by analogy goes from the specific to the specific, rather than from the specific to the general, and thus is not really inductive. In this Article, Reasoning by Analogy is discussed separately, in Section XI.

The second approach described above is a form of Inductive Logic epitomized by the American Law Institute's process of developing its Restatements of the Law, which gathered and organized court decisions from many jurisdictions, and synthesized them into general rules of law. Where the synthesis is among existing rules of law, one such inductive effort was aptly described in the British case of *Heaven v. Pender*, (1883) 11 Q.B.D. 503 (1883): "The logic of inductive reasoning requires that where two major propositions lead to exactly similar minor premises there must be a more remote and larger premise which embraces both of the major propositions."

The third approach is a blend of inductive and deductive reasoning, in that inductive reasoning is needed to canvass general principles to find likely candidates for the rule to be applied in the case, but the decision of which principles, or combination of general principles, to apply may be based on familiar deductive techniques like Modus Ponens, Modus Tollens, Reductio ad Absurdum, and the like.

F. FALLACIES OF INDUCTIVE REASONING. There are recurrent dangers in inductive reasoning that have been identified as fallacies.

1. Hasty Generalization. Hasty Generalization is inferring a conclusion about an entire class of things based on knowledge of an inadequate number of class members. Stated differently, a hasty generalization is an unwarranted conclusion that a sample of a population is representative of the entire population, so that qualities of the sample suggest identical qualities of the general population. This fallacy is also called the "Law of Small Numbers."

2. Fallacies of Distribution. The Fallacy of Distribution is a logical fallacy that results from ignoring the difference between the distributive sense of a term (referring to each member of a class) and the collective sense of that term (referring to the class as a whole). This can be either the Fallacy of Composition of the Fallacy of Division. Some writers associate this fallacy with what is called the "Representativeness Hueristic," which refers to the common inclination to assess the probability of something unfamiliar by comparing it to the probability of a familiar but different proposition.

3. Fallacy of Composition. The Fallacy of Composition occurs when you infer that something that is true of a part is also true of the whole. The Fallacy of Composition is similar to *Hasty Generalization*, in that hasty generalization is the error of attributing the qualities of a small portion of a group to the entire group. Another Fallacy of Composition is the Fallacy of Anecdotal Evidence, which uses a few examples to counter a claim based on solid evidence.

4. Fallacy of Division. The Fallacy of Division occurs when you assume that what is true of the whole is also true of a part of the whole.

5. Dicto Simpliciter. The Fallacy of Dicto Simpliciter occurs when an acceptable exception is ignored or eliminated. There are two forms: Accident (ignoring an acceptable exception) and Converse Accident (eliminating or simplifying an acceptable exception).

6. Faulty Analogy. The Fallacy of Faulty Analogy occurs when one assumes that because two things being compared are similar in some known respects, that they are therefore similar in other unknown respects. Faulty analogy is analogical reasoning whose inductive probability is low because the similarities relied upon to draw the connection between the Source and Target are tenuous or not relevant to the comparison. Faulty Analogy can be the basis for humorous quips: "Ancient Rome declined because it had a Senate; now what's going to happen to us with both a Senate and a House?" --Will Rogers.

7. False Cause. The False Cause Fallacy occurs when an argument attributes a causal linkage between events or conditions when the link has not been proved.

The Fallacy of False Cause involves the erroneous attribution of a causal relationship. The Fallacy can take several forms. It can occur when a cause is confused with an effect (Non Causa Pro Causa).

Another example is the Fallacy of Ignoring a Common Cause. The fallacy occurs when it is wrongly believed that A causes B or B causes A, when in reality both A and B are caused by an independent cause, which is C.[173]

Another example is the Post Hoc Ergo Propter Hoc Fallacy. The "Post Hoc" Fallacy is inferring that, because A precedes B, A must cause B.

The Post Hoc Fallacy was addressed in *Guevara v. Ferrer*, 247 S.W.3d 662, 667-68 (Tex. 2007), where the issue was whether the plaintiff had established, in the absence of expert testimony, that medical expenses of over $1 million were caused by an automobile accident. The Court said:

> *Daubert* and *Robinson* require trial judges to scrutinize evidence for reliability. *Robinson*, 923 S.W.2d at 554. Most federal courts that have considered the issue after *Daubert* have concluded that temporal proximity alone does not meet standards of scientific reliability and does not, by itself, support an inference of medical causation. *See, e.g., McClain v. Metabolife Int'l, Inc.*, 401 F.3d 1233, 1243 (11th Cir.2005) (concluding that a temporal relationship does not, by itself, establish causation, and rejecting "the false inference that a temporal relationship proves a causal relationship"); *Rolen v. Hansen Beverage Co.*, 193 Fed. Appx. 468, 473 (6th Cir. 2006); . . . ; *see also Roche v. Lincoln Prop. Co.*, 278 F.Supp.2d 744, 764 (E.D. Va. 2003) ("An opinion based primarily, if not solely, on temporal proximity does not meet Daubert standards."); *In re Breast Implant Litig.*, 11 F.Supp.2d 1217, 1238-39 (D. Colo. 1998) ("[A] temporal relationship by itself, provides no evidence of causation.... The fact of a temporal relationship establishes nothing except a relationship in time. Proof of a temporal relationship merely suggests the possibility of a causal connection and does not assist Plaintiffs in proving medical causation."); *Schmaltz v. Norfolk & W. Ry.*, 878 F.Supp. 1119, 1122 (D.Ill. 1995) ("It is well settled that a causation opinion based solely on a temporal relationship is not derived from the scientific method and is therefore insufficient to satisfy the requirements of [Rule] 702."). One federal court noted the importance of focusing on scientific reliability to ensure "that decision makers will not be misled by the post hoc ergo propter hoc fallacy--the fallacy of assuming that simply because a biological injury occurred after a spill, it must have been caused by the spill." *Ohio v. U.S. Dep't of the Interior*, 880 F.2d 432, 473 (D.C.Cir. 1989). This is not to say that evidence of temporal

proximity, that is, closeness in time, between an event and subsequently manifested physical conditions is irrelevant to the causation issue. Evidence of an event followed closely by manifestation of or treatment for conditions which did not appear before the event raises suspicion that the event at issue caused the conditions. But suspicion has not been and is not legally sufficient to support a finding of legal causation. When evidence is so weak as to do no more than create a surmise or suspicion of the matter to be proved, the evidence is "no more than a scintilla and, in legal effect, is no evidence." *Ford Motor Co. v. Ridgway*, 135 S.W.3d 598, 601 (Tex.2004). Nevertheless, when combined with other causation evidence, evidence that conditions exhibited themselves or were diagnosed shortly after an event may be probative in determining causation. *See, e.g., Westberry v. Gislaved Gummi AB*, 178 F.3d 257, 265 (4th Cir.1999) . . . .

Undoubtedly, the causal connection between some events and conditions of a basic nature (and treatment for such conditions) are within a layperson's general experience and common sense. This conclusion accords with human experience, our prior cases, and the law in other states where courts have held that causation as to certain types of pain, bone fractures, and similar basic conditions following an automobile collision can be within the common experience of lay jurors. . . . thus, non-expert evidence alone is sufficient to support a finding of causation in limited circumstances where both the occurrence and conditions complained of are such that the general experience and common sense of lay persons are sufficient to evaluate the conditions and whether they were probably caused by the occurrence. . . . [Footnotes omitted]

8. Suppressed Evidence. The Fallacy of Suppressed Evidence occurs when a person omits relevant data. The Fallacy is hard to detect since it is difficult to detect omitted data.

9. Common Statistical Fallacies. There are a number of misconceptions that can arise about statistical evidence. Some relate to flaws in the selection of the statistical sample, or the failure to screen out extraneous factors that might influence results. Others relate to the drawing of Invalid or Unsound conclusions from the statistical data.

a. Errors in Generating Statistics.

(1) Sampling Bias. Sampling Bias occurs when the person who is selecting examples to analyze unknowingly assembles a group of examples that is not representative of the entire group of cases. Sampling Bias can introduce unrecognized factors in the study that invalidate the conclusions derived from the results of the study. In Inductive Logic, Sampling Bias is a form of Fallacy of Composition, or assuming that a part is representative of the whole. This is also called the Fallacy of Biased Sample. Drawing samples at random is a way to avoid this Fallacy.

b. Errors in Interpreting Statistics.

(1) Fallacy of Small Sample. The Fallacy of the Small Sample occurs when the sample size is too small to justify the conclusion drawn. This is a form of the inductive Fallacy of Hasty Generalization.

(2) Base Rate Fallacy. The Base Rate is the prior probability of an event or condition, determined before new information is acquired. The Base Rate Fallacy (Ignoring the

Base Rate) occurs when the Conditional Probability of a hypothesis (H) given some evidence (E) is assessed without taking into account the "base rate" or "prior probability" of H and the total probability of evidence E. The Fallacy is also expressed as the erroneous assumption that "$p(x|y) = p(y|x)$.[174] See Section X.B.

(3) Ignoring Regression to the Mean. "Regression to the mean" is the tendency of an event that is extreme to be followed by an event much closer to the mean.

(4) Conjunction Fallacy. The Conjunction Fallacy is a belief that the likelihood of two events occurring together is greater than the likelihood of either event occurring alone. In actuality, the probability of two events occurring together can never exceed the probability of the least likely event occurring alone. In a famous psychological study published in 1983, participants were told about a woman named Linda. "As a student, she was deeply concerned with issues of discrimination and social justice, and participated in anti-nuclear demonstrations." Participants were then asked to rank eight statements (e.g., "Linda is active in the feminist movement," "Linda is a bank teller," "Linda is a bank teller and is active in the feminist movement"), based on probability. If reasoning correctly, the participant would know that the probability of a conjunction of two outcomes cannot exceed the probability of each outcome standing alone. Eighty percent of the participants found it more likely that Linda was both a feminist and a bank teller than that she was a feminist alone or a bank teller alone.[175] The psychologists gave the test to Stanford undergraduates, graduate students in psychology, and doctoral candidates in the decision science program, and found that 85-89% of the participants committed the Conjunction Fallacy.[176] Efforts to improve scores with additional explanation did not greatly improve scores.[177]

(5) Gambler's Fallacy. Given a series of identical events (a "streak") and the necessity to make a choice as to the next outcome, people must make one of three possible inductions: (1) that the streak is irrelevant, (2) that the streak will continue, or (3) that the streak will stop."[178] Those who opt for option (1), expect the next outcome to be unaffected by the past outcomes. For them, the probability of the next outcome is the base rate probability calculated before the first outcome. Option (2) is sometimes called the "Hot Hand" phenomenon, based on a psychological study of persons watching basketball. Psychologists noted that basketball fans believe it more likely that a streak of a baskets will contine while a streak of misses will come to an end.[179] Option (3) is called the Gambler's Fallacy, based on the noted proclivity of gamblers to keep on betting even when they have been losing. While the odds at the outset of ten losing hands in a row is low, after the ninth hand the odds of a losing hand are the same as after the eighth hand or before the first hand. It has been suggested that the Gambler's Fallacy arises from the representativeness heuristic leading people to believe in a "law of small numbers." People expect a sequence of events to be representative of overall probability, and that an unlikely streak of one type of outcomes must quickly end and be evened out by other events. That principle, however, would not readily explain the Hot Hand phenomenon. Another explanation would be that people who opt for (2) or (3) do not believe that the outcomes are random. When events are not in fact random, then following streaks may yield better outcomes than disregarding streaks.[180] This points up the fact that the Fallacy is only fallacious when applied to random events.

(6) Texas Sharpshooter Fallacy. The Texas Sharpshooter Fallacy describes a shooter who shoots the side of a barn and then draws the target around the place where the bullets hit. The Fallacy is an effect of the "clustering

illusion," or the belief that random events that occur in clusters are not really random.

c. Statistics in the Law. The role of statistics in the legal process is not well-understood by judges, lawyers, witnesses, and jurors. In 2007, Jonathan Koehler, a professor at the University of Texas School of Business, published on the internet a preliminary draft of an article discussing nine statistical fallacies.[181]

(1) Misconception #1: **The Importance of Statistics in Litigation.** The first misconception addressed by Professor Koehler is the view that jurors overweight statistical evidence, a view espoused by Harvard Law Professor Lawrence Tribe in his 1971 law review article, L. Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 HAR. L. REV. 1329 (1971). Psychological studies show just the opposite.[182]

2. Misconception #2: **Small Samples Are Not Informative.** People wonder how a survey of 1,000 people can accurately represent millions of Americans. The reliability of a survey (called "the margin of error") is unrelated to the size of the population that the survey seeks to describe. The more important consideration is the extent to which members of the sample were selected at random from the population of interest.[183]

3. Misconception #3: **The Significance of "Statistically Significant."** Sample size plays a central role in determining whether a difference is statistically significant. Large sample sizes are more likely to yield statistically significant differences. But sample size plays no role at all in determining whether a difference is practically significant. Statistical significance is reflected as a "p-value." The p-value identifies the probability that a disparity as large (or larger) than that observed in the study would occur with random chance. Professor Koehler wrote:

> Statistical novices also mistakenly assume that statistically significant differences are practically important and that statistically insignificant differences are practically unimportant. However, it is important to distinguish between these two types of significance. Sample size plays a central role in determining whether a difference is statistically significant. Large sample sizes are more likely to yield statistically significant differences. But sample size plays no role at all in determining whether a difference is practically significant.[184]

(4) Misconception #4: **Correlation Implies Causation.** In truth, correlation does not imply causation. Just because two variables are correlated or associated with one another, does not mean that one of the variables caused the other. The correlation could result from an unrecognized third variable. Nonetheless, people rely on correlation as a primary indicator of causality, and people sometimes equate degree of correlation with degree of causal strength. One way to combat this misconception is to identify the third variable, and push it aggressively as a possible cause.[185]

(5) Misconception #5: **Base Rates Don't Matter.** One of the most prevalent misconceptions is that background probabilities (called "base rates") are irrelevant for specific judgments. Professor Koehler wrote

> Though base rate evidence sometimes "feels" different from other types of evidence, it is no more or less inherently probative than individuating or direct evidence. An 80 percent probability of guilt based entirely on a base rate carries with it the same 20 percent chance of a false conviction as an 80 percent

> probability of guilt based on, say, the somewhat unreliable testimony of an eyewitness.

Appellate courts have, on occasion, rejected base rate statistics as not being sufficiently tied to the specific case to be helpful to the fact finder.[186]

(6) Misconception #6: **A Small Match Probability Implies Source Identification.** Forensic evidence does not match one thing to another with certainty; it is probabilistic evidence, comparing the probability that the match would occur at random given the underlying population. Professor Koehler notes:

> [I]f the match is rarer than the number of people on earth (e.g., 1 in 10 billion), there couldn't be a second person who matches as well, right? Wrong. The probability that at least one other person in a population of 6.5 billion will match a set of genetic markers that occurs just one time in 10 billion is about 48%.[187]

(7) Misconception #7: **The Match Probability Identifies the Chance of Innocence.** Forensic experts will present evidence that requires statistical analysis before the significance of the evidence can be understood. Taking for example evidence of a DNA match with blood at a crime scene, testimony will be introduced regarding the frequency in which the genetic profile occurs in the population, which is the probability of finding a match with a person who is not the source of the evidence. Professor Koehler points out that jurors are more interested in knowing how likely it is that the accused is the person who left the blood stains.[188]

(8) Misconception #8: **Error Rates: Nice to Have But Not Essential.** In some instances the statistical evidence (particularly DNA matches) has a very small match probability while the chance of a mismatch (i.e., the error rate) is much larger. When this happens, then the importance of the statistical evidence is controlled by the chance of an error. Nonetheless, appellate courts have been unwilling to overturn convictions for failure to admit error rates.[189]

(9) Misconception #9: **Non-Unique Matches Are Worthless.** Non-unique match evidence is statistical evidence that is able to reduce the group of potential individuals to a small group but not an individual. This leads to an argument, termed "the Defense Attorney Fallacy," that twenty males (or whatever the count may be) might be the perpitrator. This argument fails to distinguish between probative evidence and conclusive evidence. Non-unique evidence is very probative if the inclusion group is small compared to the exclusion group, and the addition of the statistical evidence to other evidence of guilt can substantially increase the likelihood of guilt.[190]

10. Confusing Unexplained with Unexplainable. The Fallacy of Confusing the Unexplained with the Unexplainable occurs when there is no apparent explanation of something using known principles, and it is therefore concluded that the explanation is unknowable.

11. False Continuum. The Fallacy of False Continuum is the idea that, because there is no clear demarcation between two things, that those things therefore cannot be distinguished.

IX. ABDUCTIVE REASONING. Abductive Reasoning was suggested by American philosopher, logician, mathematician, psychologist, scientist and thinker Charles Sanders Peirce[191] in 1883 to describe the way people generate hypotheses explaining apparent correlations between certain events or conditions. Peirce was not convinced that deductive and inductive logic together

captured the essence of man's apprehending the world. Peirce believed the human mind, being a product of the world, "naturally thinks somewhat after nature's pattern," and that people "often derive from observation strong intimations of truth, without being able to specify what were the circumstances we had observed which conveyed those intimations."[192] Based on psychological studies of human perception, Peirce believed that perceiving the world gave rise to perceptual judgments that brought with them universal propositions, in a manner that was "not controllable and therefore not fully conscious."[193] Peirce viewed those propositions as hypotheses, coming to life through "an act of insight" that arose "like a flash."[194] Peirce named this process "hypothesis inference" (or "abductive inference").

In some of his writings, Peirce divided non-deductive reasoning into three types:

> Let us now consider non-necessary reasoning. This divides itself, according to the different ways in which it may be valid, into three classes: probable deduction; experimental reasoning, which I now call Induction; and processes of thought capable of producing no conclusion more definite than a conjecture, which I now call Abduction.[195]

Peirce described Abductive Reasoning as a process of "examining a mass of facts and in allowing these facts to suggest a theory. In this way we gain new ideas; but there is no force in the reasoning."[196] Abductive Reasoning works the opposite direction from deduction: with deduction, the Antecedent is used to get to the Consequent. Looked at syllogistically, Abduction takes a known Conclusion and an known Minor Premise and intuits the Major Premise. Looked at from the standpoint of Conditionals, in Abductive Reasoning the Consequent is used to get to the Antecedent.[197]

The abductive process may originate with intuition, but through a process of verification certain hypotheses may be eliminated because they do not square with the facts. A hypothesis is "valid" if it is the best explanation of the correlations under consideration. Abduction has been described as a process where a theory and some data are combined to derive a premise. Examples:

All humans are mortal.
Socrates is mortal.
Therefore, Socrates must be human.

To use an example suggested by Peirce:

The surprising fact, C, is observed;
But if A were true, C would be a matter of course,
Hence, there is reason to suspect that A is true.[198]

The foregoing Syllogism exhibits the Fallacy of the Undistributed Middle, and is not Valid. It does, however, suggest an hypothesis that could be true, and can be subjected to verification.

If you have the flu, you have a mild fever.
You have a mild fever.
Therefore, you may have the flu.

The foregoing Conditional Syllogism exhibits the Fallacy of Affirming the Consequent, and is not logically Valid. It does, however, suggest an hypothesis that can be confirmed or rejected by testing.

The purely-logical interpretation of Peirce's concept leaves out an important component of Pierce's beliefs. Peirce did not consider perceptual judgment to be discrete from hypothetical inference; he viewed perceptual judgments as extreme cases of hypothetical

inference. In science, the hypothesis, arising from perception becomes an ongoing tool for making observations and applying the methods of deductive and inductive logic to arrive at objectively verified conclusions.[199] Peirce went beyond the conceptual framework just outlined, however, because he associated hypothetical inference with a feeling of great intensity, which he identified as emotion.

Peirce identified two types of logic: *logica utens* and *logica docens*. Logica utens is a rudimentary sense of logic-in-use, which produces insight through a process not visible to the conscious mind and not susceptible to explanation. Logica docens is a consciously-developed skill set that we are taught, or that we develop, to us in an analytical fashion in our daily lives and work.[200]

Peirce believed that if two or more hypotheses are consistent with the data, there is a long-standing preference for the simpler of the two. See Occam's Razor and the Rule of Parsimony. In Peirce's words, Pearce suggested that the least extraordinary hypothesis is preferred.

X. REASONING IN UNCERTAINTY. Some theorists have suggested that ordinary reasoning is not based on valid deductive methods because deductive reasoning deals with absolutes while everyday reasoning is uncertain. While it is true that reasoning is uncertain when people are called upon to make choices that can affect outcomes, the logic structure of Modus Ponens (especially when expressed in the cause-and-effect relationship) nevertheless underlies most people's assessments of the way the present relates to the future. Apart from that, Deductive Logic's approach of constructing and attacking arguments by identifying Premises and Conclusions, and seeing how they relate, is the way most legal arguments are approached.

Deductive Logic assumes that the relationships it asserts between Terms or between Propositions are absolute, guaranteed relationships that are either true or false. Inductive Logic involves issues where absolute certainty is unattainable, and that the support for Conclusions comes in degrees of strength, most often characterized as probabilities.[201] Thus, Inductive Logic involves the degree of evidentiary support for contingent claims.[202]

Probability is a world unto itself. The mathematical study of probabilities started with Blaise Pascal and Pierre de Fermat in the 1600s, was expanded by Pierre De Laplace in the 1800s, was introduced into formal logic by George Boole in 1854, and was further advanced by John Venn in 1876. The actual calculation of probabilities is outside the realm of normal decision-making. However, understanding the essential aspects of probability theory can be useful in evaluating arguments, even in normal speech.

There are many situations where it is not possible to assign probabilities to conclusions. People still apply reasoning to those kinds of issues. Some theorists apply belief-based approaches to conditionals.

A. THE BASIC RULES OF PROBABILITY. In probability theory, the probability of an outcome or that a condition exists ranges from zero to one, and is stated as a percentage. Something that will not happen has a probability of 0%, and something that is certain to happen has a probability of 100%. Something that is as likely to happen as not happen has a probability of 50%. To determine the probability that any one of a series of independent events will occur, you add the probabilities of each event

happening.[2] To determine the probability that each and every one of a series of events will occur, you multiply the probabilities of each event.

B. CONDITIONAL PROBABILITY. "Conditional Probability" is in one sense the probability that event "q" will occur given that event "p" has occurred. The conditional probability of "q", given "p", is indicated by the symbol "P(q|p)". Conditional Probability can also involve our level of confidence that a condition or circumstance exists, based on the information we know. In such an instance, "P(q|p)" describes not probability of outcomes of a series of future events, but instead the probability that a particular condition "q" exists given that condition "p" has been proven to exist. Conditional Probability can also be used as a way to quantify Inductive Logic, when you assess the probability that a hypothesis is true given new evidence. This formulation would be "P(h|e)", or the probability of hypothesis "h" given evidence "e".

1. Where Probabilities Can Be Determined With Certainty. In some instances, all possible outcomes and the probability of each are known in advance. An example is the probabilities of "heads" or "tails" in a series of coin tosses.

a. Prior Probability. In a particular situation, it may be possible to determine the probabilities of different outcomes in advance. This would be an instance of "Prior Probability." The Prior Probability of the outcomes from tossing two coins can be easily determined: Example:

You are going to toss a nickel and then toss a dime, and determine the likelihood of having two "tails." There are four possible outcomes, reflected in the following table (where "H" means "heads" and "T" means "tails":

Nickel	Dime
H	H
H	T
T	H
T	T

The table is similar to a Truth Table because both analyses are bivalent (True-False and Heads-Tails). It can be seen that, before any coin tossing is done, the probability of two "heads" is 1 out of four 4 (1/4), the probability of one "head" and one "tail" is two out of four (½), and the probability of two "tails" is one out of four (1/4), for a total of 1. By the way, it doesn't matter if the coins are flipped in sequence or simultaneously, the probabilities of outcome are the same.

b. The Monty Hall Dilemma. The Monty Hall Dilemma is named after the Monty Hall, the host for the television games show Let's Make a Deal, which aired from 1963 to 1976. The problem came to the world's attention through two 1990-91 Parade Magazine column of Marilyn Vos Savant, reputedly the world's smartest person. Craig F. Whitaker, of Columbia, Maryland, sent the following question:[203]

> Suppose you're on a game show, and you're given the choice of three doors. Behind one door is a car, behind the others, goats. You pick a door, say #1, and the host, who knows what's behind the doors, opens another door, say #3, which has a goat. He says to you, "Do you want to pick door #2?" Is it to your advantage to switch your choice of doors?

Vos Savant answered:

[2]The probability of "A or B" occurring is the probability of A added to the probability of B. Stated symbolically, $P(A \vee B) + P(A) + P(B)$. This holds true only if the events are mutually exclusive. If not mutually exclusive, then $P(A \vee B) = P(A) + P(B) - P(A \wedge B)$.

Yes; you should switch. The first door has a 1/3 chance of winning, but the second door has a 2/3 chance. Here's a good way to visualize what happened. Suppose there are a million doors, and you pick door #1. Then the host, who knows what's behind the doors and will always avoid the one with the prize, opens them all except door #777,777. You'd switch to that door pretty fast, wouldn't you?

Vos Savant's answer created a storm of controversy. She received nearly 10,000 letters, including letters of protest from highly-degreed individuals who disagreed with her, and were sometimes condescending. An example:

> You blew it, and you blew it big! Since you seem to have difficulty grasping the basic principle at work here, I'll explain. After the host reveals a goat, you now have a one-in-two chance of being correct. Whether you change your selection or not, the odds are the same. There is enough mathematical illiteracy in this country, and we don't need the world's highest IQ propagating more. Shame!
>
> Scott Smith, Ph. D.
> University of Florida

Vos Savant answered these complaints as follows:

> Good heavens! With so much learned opposition, I'll bet this one is going to keep math classes all over the country busy on Monday.
>
> My original answer is correct. But first, let me explain why your answer is wrong. The winning odds of 1/3 on the first choice can't go up to 1/2 just because the host opens a losing door. To illustrate this, let's say we play a shell game. You look away, and I put a pea under one of three shells. Then I ask you to put your finger on a shell. The odds that your choice contains a pea are 1/3, agreed? Then I simply lift up an empty shell from the remaining other two. As I can (and will) do this regardless of what you've chosen, we've learned nothing to allow us to revise the odds on the shell under your finger.
>
> The benefits of switching are readily proven by playing through the six games that exhaust all the possibilities. For the first three games, you choose #1 and "switch" each time, for the second three games, you choose #1 and "stay" each time, and the host always opens a loser. Here are the results.

Game	Door 1	Door 2	Door 3	Result
#1	Auto	Goat	Goat	Switch/Lose
#2	Goat	Auto	Goat	Switch/Win
#3	Goat	Goat	Auto	Switch/Win
#4	Auto	Goat	Goat	Stay/Win
#5	Goat	Auto	Goat	Stay/Lose
#6	Goat	Goat	Auto	Stay/Lose

> When you switch, you win 2/3 of the time and lose 1/3, but when you don't switch, you only win 1/3 of the time and lose 2/3. You can try it yourself and see. Alternatively, you can actually play the game with another person acting as the host with three playing cards—two jokers for the goat and an ace for the prize. However, doing this a few hundred times to get statistically valid results can get a little tedious, so perhaps you can assign it as extra credit—or for punishment! (That'll get their goats!)

The foregoing is an example of Conditional Probability, and the fact that in certain situations one event can affect the probability of the next event. Recalculating odds based on

new information is determining Posterior Probability, discussed in the next section.

c. Posterior Probability. If the probability of a sequence of events is considered, the probability of the ultimate outcome can change from its Prior Probability as each event occurs. In the example of two coins flipped in succession, consider the probabilities calculated after the first coin is tossed. If the first coin came up "heads," the probability of having two "heads" after the next coin toss is ½, the probability of having one "head" and one "tail" is 1/2, and the probability of having two "tails" is zero. The probability after the first coin toss is called "Posterior Probability." In a multi-event series, the Posterior Probability can be recalculated after each event.

The Posterior Probability, or "what is the probability of q given p?", can vary from zero (when $p \rightarrow \neg q$) to one (when $p \rightarrow q$), or anywhere in between, when the implication relationship is not absolute. Symbolically, the probability of "q" given "p" is shown as "P(q|p)".

The accepted way to calculate the Conditional Probability of an event or condition, based on information received after the Initial Probability was calculated, is Bayes' Formula.[204] The theorem behind Bayes' Formula is that the probability that event B will occur, given that event A has occurred, depends not only on the relationship between B and A but also on the likelihood of B without regard to A, and the likelihood of A without regard to B. Stated differently, there are three parameters involved in Bayes' Theorem: the prior degree of belief in the claim, how likely the evidence would be if the claim were true, and how likely the evidence would be if the claim were false.[205]

Conditional Probability applies not just to outcomes of sequential events. It also applies to recalculating the probability that a certain condition exists, based on increasing amounts of information. An example would be: what is the probability that a female patient has breast cancer, given a mammogram indicating the presence of cancer? Bayes's Formula applied to updating a hypothesis based on new information is:

$$P(H|D) = \frac{P(D|H)\,P(H)}{P(D)}$$

where, H is the hypothesis, D is the data, P(H) is the prior probability of H (i.e., the probability that H is correct before seeing the data D), P(D|H) is the conditional probability of seeing the data D given that H is true (called "the likelihood"), P(D) is the marginal probability of D (i.e, the probability of witnessing the data under all possible hypotheses), and P(H|D) is the posterior probability (the probability that H is true, given the prior belief regarding H, and D).[206]

A Bayes' Formula Calculator is available on-line.[207] Bayes' Formula can be used for "assessing the likelihood of an event by updating a prior probability in light of new evidence."[208]

2. Where Probabilities Cannot Be Determined With Certainty. In most instances in real life, the probabilities of different outcomes cannot be determined by probability theory alone. For example, the probability of Barak Obama's winning the U.S. presidency was generally discounted before the Iowa caucuses. With the additional information that Obama won the Iowa caucuses, the probability of his election increased. With the additional information that Hillary Clinton won the New Hampshire primary, Obama's probability of election diminished. When Obama won the South Carolina primary, his chances of being elected president increased again. When Obama won the Democratic nomination, his chances of

election became very high. In each instance, the probability of Obama's being elected president changed as new events came forward. This is a form of Posterior Probability, "P(q|p)", only with multiple events: "P(q|p_1, p_2, p_3, p_4, p_5 . . . p_n,)", where "q" is the probability that Obama would be elected president and where "p_1" is the first piece of information, "p_2" is the second piece of information, and "p_n" is the final piece of information.

Expressed in terms of Conditional Probability, Modus Ponens ("p → q") is expressed "P(q|p)". Expressed in terms of Conditional Probability, Modus Tollens ("¬p → ¬q") is expressed "P(¬p|¬q)".

The late Berkeley Logician Earnest W. Adams suggested that people normally don't suggest probabilistic Conditional Propositions unless they think the "subjective probability" of the Implication is high. Subjective Probability in this sense is: P(b|a) = P(ba) ÷ P(a).

C. BELIEF REVISION. It is sometimes necessary to apply reasoning to Conditionals that do not fit the True-False dichotomy of bivalent Logic or even differing degrees of probability. Some theorists have proposed a belief-based approach for those situations. "Belief revision" refers to the process of changing beliefs based on new information. In 1929, Frank Ramsey suggested that when people accept a Conditional Proposition "if A then C" they are "fixing their degree of belief in C given A." Ramsey proposed what has become known as The Ramsey Test: to decide whether to believe a Conditional Proposition in the face of new information, provisionally or hypothetically add the updated Antecedent to your stock of beliefs, and consider whether to believe the Consequent.[209] The Bayesian approach to conditional probability relates probabilities to subjective degrees of belief.[210] But belief revision must still occur even when probabilities cannot be determined.

XI. REASONING BY ANALOGY. In Logic, an analogy is an inference that, because two things are similar in some respects, they are therefore similar in other respects. When we reason by analogy, we compare something new to something familiar and, if the comparison is close enough, we treat the new like we would the familiar. If the familiar is A, and the new is B, the validity of the inference that B is like A depends on the degree of similarity between B and A. If the similarities are few, then the inference is weak. If the similarities are not relevant to the matter at hand, then the inference is weak. Analogy operates with points of comparison, where aspects of the familiar, A, are matched to aspects of the new, B. The forensic matching of fingerprints using points of comparison is a classic example of reasoning by analogy. But the strength of the analogy is not just quantitative; it is also qualitative. The quality of the analogy is more compelling when the similarities are relevant to the matter under consideration. Dissimilarities between the two items being compared can degrade the analogy.

In discussions about reasoning by analogy, the familiar item is called the "Source" and the new item we are comparing is called the "Target." Because analogy operates from the particular to the particular, it is often differentiated from deductive reasoning (which moves from the general to the specific) and inductive reasoning (which moves from the specific to the general). Francis Bacon and John Stuart Mill, however, believed that analogy is just a special case of inductive reasoning, where the Source has features A, B, and C, while the Target has features A and B, and the conclusion is reached that the Target likely also has feature C. Stated differently, reasoning by analogy is reasoning from the existence of some similarities between two items to the existence of other similarities between those items. Another distinction is that analogy is based on one

Source, whereas Inductive Logic is generally based on a large number of samples, the more the better. Reasoning based on a number of common features is called "homology."[211] However, reasoning by analogy can be viewed more abstractly, where things that are physically dissimilar can be viewed as matching from a conceptual perspective. This type of analogy is described: "A is to B" as "C is to D". Example: "Hand is to palm as foot is to sole." The palm of the hand and the sole of a foot are physically dissimilar, but the relationship between the hand and the palm can be said to be analogous to the relationship between the foot and the sole. This has been called "shared abstraction."

An analogy is strong or weak depending upon the competition between the similarities and dissimilarities of the objects being compared and the extent of the "unexplored region of unascertained properties."[212] However, there may also be a competition between competing analogies.[213] Where the similarities between the objects being compared are many, and the dissimilarities minor, then argument from analogy can approach in strength a valid deduction.[214] Where the similarities are weak, or the dissimilarities strong, or the "unexplored region" very great, then the analogy reduces to a mere guide-post pointing the direction for more rigorous examination.[215]

Analogies are a common method of argumentation, where something unfamiliar to an audience is analogized to something familiar, or something complex is analogized to something that is easier to understand. Many trials of complex issues end up being presented to juries as a contest between two competing over simplified analogies.

"False Analogy" or "questionable analogy" is a belief or perception that two different items are sufficiently similar that the principles that apply to one are applicable to the other when the similarities are not strong enough to support that Conclusion. In common parlance we say: "That's comparing apples and oranges." A legal argument that a prior case is "distinguishable" is a claim of false analogy. There are nearly always differences between the Source and the Target. The question is whether these differences are material.

In argumentation, analogy sets up the argument that, where two situations are similar in some ways, then what holds true for one situation must hold true for the other situation. In legal disputes, analogy is often used to determine which principles of law should be applied to resolve the dispute. Professor Edward Levi suggested that reasoning by analogy in the common law involves three steps: (1) establishing that the current case is similar to an earlier case; (2) determining the rule of law used to resolve the earlier case; (3) applying the same rule of law to the current case.[216]

A clear example of reasoning by analogy is the case of *Kyllo v. U.S.*,[217] where the U.S. Supreme Court had to decide whether the government's use, at a distance, of a "thermal imaging device" (heat sensor) to detect whether a person was using high intensity lights in his home that are needed to grow marijuana, constituted a "search" that required probably cause and a search warrant under the Fourth Amendment. The Supreme Court analogized the technique as being similar to the sound waive interception that was held, in *Katz v. United States*, to require probable cause and a search warrant. Thus, because of the similarity between the non-physical detection of voice waves and the non-physical detection of heat waves, the rule applying to sound waves *(Katz*) was applied to the case heat waves (*Kyllo*).

Here is an example of a court rejecting a proposed analogy:

> Avenell contends, "Once a landlord conveys the property to a third-party, he is no longer entitled to collect rent on the property." The cases he cites to support this contention, however, are inapposite. First, in *Ellison v. Charbonneau*, a 1936 case from the Fort Worth court of appeals, the court concluded that when a landlord evicts a tenant, he is not entitled to the rent due under the lease. See 101 S.W.2d 310, 314-15 (Tex. Civ. App.--Fort Worth 1936, writ dism'd). But Chrisman did not evict Avenell; instead, Avenell defaulted on the lease.[218]

XII. INFORMAL LOGIC. Informal Logic is the study of argumentation in natural language settings. As Aristotle noticed, the most frequent use of logical principles is in discussions and arguments. Because the natural language is easier to understand, many teachers prefer Informal Logic over Formal Logic as an approach to teaching argumentation in their classes, and much Informal Logic literature has to do with teaching and learning good and bad approaches to argumentation.

An historical example of what is today called Informal Logic is the dialogues of Plato. The reasoning demonstrated in Plato's dialogues are *dialectical*, meaning that truth is pursued through a dialogue of two or more persons, whose point-counter-point discussion leads to an unmasking of weak arguments and a greater understanding of the point being debated. The Socratic Method is a type of dialectical process, where two individuals with opposing views ask each other questions and give each other answers in an effort to prove that the argument of the other wrong. The Socratic Method has been loosely adapted to law school education, where the professor calls upon a first-year student to explain the legal principle underlying a court ruling and then defend it against counter-arguments or against reconfigured hypotheticals posed by the professor that require the student to apply the legal principle to shades of different facts.

Nowadays Informal Logic talks about many of the same subjects addressed by Formal Logic, but in more conversational terms. The requirement of Deductive Logic that Premises be true is abandoned as not reflecting the issues most people deal with in their daily lives. And the structure attributed to argumentation is not Deductive Logic.

The first International Symposium on Informal Logic occurred in 1978. Early work on argumentation schemes focused on fallacies, as examples of argumentation schemes to avoid. This approach has been criticized on the ground that it is hard to teach good argumentation skills by studying the bad. Another criticism is that in many instances supposedly-fallacious arguments are appropriate. For example, an appeal to authority is considered to be a fallacy of argumentation and yet, in legal argumentation, it is expected that both sides will appeal to legal authorities that favor their positions. Ad Hominem attacks are a fallacious argument, and yet many ad Hominem attacks are valid attacks on the credibility of the person whose statements are being evaluated. And even logical fallacies can lead to valid insights or can be used to generate plausible hypotheses.[219] This suggests that the invalidity of a fallacy is determined not just by the structure of the fallacy, but also by its content.[220] Fallacies of Argumentation are discussed in Section XV.

Informal Logic has also developed what it calls "argumentation schemes," which are models of how arguments are constructed and presented in everyday discourse, including law and science. They include elements of Logic but are not controlled by the principles of Logic. See Section XVII.

An important part of Informal Logic is accepting uncertainty or even inaccuracy about one's propositions. Arguments need not be 100% right; they may be "defeasible," meaning subject to invalidation. See Section XVII.B. It is possible that a partially-false or even entirely-false Premise might support the Conclusion of a good defeasible argument. In this light a good argument is not just one that is Valid and Sound. A good argument is also one that fulfills its purpose even if it is Invalid or Unsound.[221]

XIII. THE SPECIAL LOGIC OF STATUTORY INTERPRETATION. While much of what is written above applies to courts determining the meaning of statutes, the analysis of statutory interpretation has come to be dominated by fundamental issues about how humans interact with language and how meaning is derived from or attributed to words and other symbols.[222] Additionally, a set of rules of interpretation have developed that are designed for the purpose of interpreting statutes. Statutory interpretation problems can arise from vagueness or ambiguity or amphiboly in the statutory language, conflicts between statutes, and conflicts with constitutional provisions. Statutory interpretation problems can also arise when it is not clear, in a particular case, whether a statute applies, and if so, how it should be applied to resolve the dispute. A person's approach to resolving these difficulties is influenced by a person's philosophy of language, political philosophy, and method of perceiving and reasoning.

A. PHILOSOPHY OF INTERPRETING STATUTES. Much has been written about the philosophy of interpreting statutes, both by judges and by law professors and even professors in other fields. In all instances the courts say that they are attempting to determine legislative intent.[223] As Justice Reed pointed out:

> The interpretation of the meaning of statutes, as applied to justiciable controversies, is exclusively a judicial function. This duty requires one body of public servants, the judges, to construe the meaning of what another body, the legislators, has said.[224]

At the present time there are three main schools of thought about statutory interpretation: textualist; intentionalist; and purposivist. The differences can be explained as a debate over what information a court should consider in interpreting a statute. Chief Justice John Marshall once wrote: "Where the mind labors to discover the design of the legislature, it seizes everything from which aid can be derived."[225] Analysis indicates that some judges who have identified themselves with a particular philosophy of statutory interpretation sometimes use that approach and sometimes do not, depending on whether it adds to or detracts from their position in a particular case. Additionally, although legal writers have published many weighty writings about different approaches to statutory interpretation, it is not at all clear that the judiciary is influenced by the intellectual debate.

1. Textualist Approach. The strict statement of the textualist view was given by the Texas Supreme Court in 1920:

> Courts must take statutes as they find them. More than that, they should be willing to take them as they find them. They should search out carefully the intendment of a statute, giving full effect to all of its items. But they must find its intent in its language and not elsewhere . . . .[226]

Textualists no longer subscribe to the view that only the wording of the statute may be considered. Generally, however, the textualist position says that the words of the statute are the preeminent indicators of legislative intent.

After all, it is only the language of the statute that passed both houses of the legislature and was signed by the chief executive. Committee reports, bill analyses and testimony at committee hearings were voted on by no one. Proponents of the textualist view argue that words have fixed meanings that can be objectively discerned. In case of vagueness or ambiguity, descriptive canons can be used to resolve uncertainties of meaning. Textualists do not approve looking at legislative history, because committee reports and floor debates reflect the views of only a few legislators, and because such information is not as readily available to the public as the language of the statute itself, raising an issue as to whether the statute gives fair notice of what is allowed and what is prohibited.[227]

2. Intentionalist Approach. The intentionalist approach calls for courts to use all relevant indicators of legislative intent, not just the language of the statute. Going beyond the words of the statute exposes the analysis to the risk that the additional information may not be representative of all, or even a majority, of legislators. The fact that a witness may testify to opinions regarding the statute, or the problem addressed by the statute, in a committee hearing where some of the committee members are absent and others are engaged in conversation, is of limited usefulness in determining legislative intent.

Psychologists who study decision-making suggest that, after a point, adding more information can reduce the quality of the decision.[228]

What is legislative intent anyway? Possible answers to this question are problematic. Legislation typically has several sponsors, who are not necessarily of one mind regarding intent, and a bill often undergoes changes suggested by non-sponsors as it passes through the legislative process.[229] The Texas Supreme Court said that "the intent of an individual legislator, even a statute's principal author, is not legislative history controlling the construction to be given a statute. It is at most persuasive authority as might be given the comments of any learned scholar of the subject."[230] Professor Levi said "it cannot be forgotten that to speak of legislative intent is to talk of group action, where much of the group may be ignorant or misinformed."[231] And true intent of Congress or a state legislature is a fiction anyway, because many votes are along party lines, some bills (especially in the U.S. Congress) are too big for any Congressman or Senator to read in the available time, and it is self-evident that the Congress and Senate (or upper and lower house in a state legislature) cannot be said to have a unified intent on anything, except for the simplest, most cut-and-tried propositions. Justice Cardozo wrote:

> 'The fact is,' says Gray in his lectures on the 'Nature and Sources of the Law,' 'that the difficulties of so-called interpretation arise when the legislature has had no meaning at all; when the question which is raised on the statute never occurred to it; when what the judges have to do is, not to determine what the legislature did mean on a point which was present to its mind, but to guess what it would have intended on a point not present to its mind, if the point had been present.'[232]

3. Purposivist Approach. The purposivist approach to statutory interpretation says that the meaning of a statute should evaluated in light of the purpose behind the legislation. U.S. Supreme Court Justice Stephen Breyer is a noted proponent of this view. He has explained and justified his position in writings and speeches over the years. In his 2005 book, ACTIVE LIBERTY: INTERPRETING OUR DEMOCRATIC CONSTITUTION, Justice Breyer wrote:

> At the heart of a purpose-based approach stands the "reasonable member of

> Congress"—a legal fiction that applies, for example, even when Congress did not in fact consider a particular problem. The judge will ask how this person (real or fictional), aware of the statute's language, structure, and general objectives (actually or hypothetically), would have wanted a court to interpret the statute in light of present circumstances in the particular case.[233]

In a 1991 law review article, Judge Breyer (then Chief Judge of the First Circuit Court of Appeals) articulated five instances where legislative history was important: "(1) avoiding an absurd result; (2) preventing the law from turning on a drafting error; (3) understanding the meaning of specialized terms; (4) understanding the "reasonable purpose" a provision might serve; and (5) choosing among several possible "reasonable purposes" for language in a politically controversial law."[234] Justice Breyer interpreted the "intent" of Congress as Congress's "purpose." He argued that the purpose of a statute could be determined without regard to the private motive of each legislator in voting for or against the statute.[235] In *Houston Bank & Trust Co. v. Lee*, 345 S.W.2d 320, 322-23 (Tex. Civ. App.--Houston 1961, writ dism'd), in arriving at legislative intent, the court cited and quoted from articles published by members of the State Bar committee that drafted the Texas Probate Code.

B. CANONS OF STATUTORY CONSTRUCTION.

1. Code Construction Act. The starting point for interpreting a Texas statute is the Texas Code Construction Act, Tex. Gov't Code ch. 311, which contains a number of rules that the Legislature has given to courts to control and standardize the way courts interpret Texas statutes. Tex. Gov't Code Ann. § 311.021 says that, in construing codes, the Legislature intends: that the statute be constitutional, that the entire statute be effective, that the statute lead to a just and reasonable result, that execution be feasible, and that public interest be favored over private interest.

The Texas Government Code settles the textualist-intensionalist-purposivist debate in Texas. Section 311.023 says that, in construing a code, whether or not ambiguous, the court may consider: the object sought to be attained; circumstances under which the statute was enacted; legislative history; common law and former statutes; consequences of a particular construction; administrative construction of the statute; and title, preamble and emergency provision. Section 312.005 says, "[i]n interpreting a statute, a court shall diligently attempt to ascertain legislative intent and shall consider at all times the old law, the evil, and the remedy." Section 312.006 says that "[t]he Revised Statutes are the law of this state and shall be liberally construed to achieve their purpose and to promote justice." The pros and cons discussed in the national debate regarding textualist, intentionalist, and purposivist approaches to statutory interpretation remain as considerations that courts should keep in mind in deciding the scope and weight of information they will consider in ascertaining statutory intent.

2. Common Law Canons of Construction. In addition to the Code Construction Act, there are a number of "canons" of statutory construction that have been set out in case law. This discussion is a thumbnail sketch, as a full discussion would take an entire article to itself.

Theorists divide the canons of statutory construction into "descriptive canons" and "normative canons."[236] Descriptive canons are designed to aids courts in determining the meaning of the words in the statute. Normative canons, which involve policy-

based choices, come into play when the standard methods of discerning the meaning of the words fails to pinpoint the meaning.

Descriptive canons include:

- Plain/Common Meaning[237]
- Ejusdem generis[238]
- Expressio unius est exclusio alterius[239]
- In pari materia[240]
- Noscitur a sociis[241]
- Reddendo singula singulis[242]
- Generalia specialibus non derogant[243]
- Construe the statute as a whole[244]
- Construe the statute to have effect[245]
- Presume adoption of court interpretations of identical prior statutes[246]
- "And" and "or" are not interchangeable[247]

Normative canons include:

- Avoid constitutional issues[248]
- Assume constitutionality[249]
- Presumption against retroactivity[250]
- Consider all laws bearing on the same subject[251]
- If statutes conflict, find the dominant legislative intent[252]
- Harmonize with other relevant statutes[253]
- Avoid an interpretation that would make a provision absurd or meaningless[254]

Some normative canons for federal courts include:

- Avoidance of constitutional issues[255]
- "Charming Betsy" canon[256]
- Interpretation in light of fundamental values[257]
- Rule of lenity[258]
- Avoidance of abrogation of state sovereignty[259]
- Deference to administrative interpretations[260]

Problems occur when two or more canons apply to an issue, and the court must determine which canon receives precedence. It is generally held that normative canons are subordinate to descriptive canons, and should be used only when descriptive canons fail to resolve the uncertainty.[261]

XIV. RHETORIC. Ancient Greece was governed by a council of landed aristocrats, who selected certain individuals of the group to serve as executives. Around 590 B.C., the ruling council appointed one of their members, named Solon, to draft political reforms to stimulate economic growth and political cohesion. Solon's reforms allowed more participation in government processes by a broader range of Greeks. In 508 B.C., the Greeks opened government further by creating the Assembly, which was a policy-making body made up of all male citizens over the age of twenty. A court system was established, that allowed citizens to seek legal redress but, as there was no class of lawyers, litigants had to plead their own cases to a jury of citizens. The structure of Greek government permitted advantages to those who could speak effectively in public in support of their own goals and interests, and against inimical goals and interests. Over time, the Greeks studied effective persuasive speaking and developed approaches to teaching the ways to communicate effectively. While philosophers like Plato were interested in how to effectively communicate philosophical truths, his student Aristotle was more interested in techniques of effective communication independent of the subject matter, regardless of whether the occasion was a funeral oration, a religious speech, a legal proceeding, deciding a political question, or just having a conversation with friends.

Here are some definitions of Rhetoric, over the ages[262]:

> Plato: Rhetoric is "the art of winning the soul by discourse."

> Cicero: "Rhetoric is one great art comprised of five lesser arts: inventio, dispositio, elocutio, memoria, and pronunciatio." Rhetoric is "speech designed to persuade."
>
> Quintillian: "Rhetoric is the art of speaking well."
>
> Francis Bacon: Rhetoric is the application of reason to imagination "for the better moving of the will."
>
> George Campbell: "[Rhetoric] is that art or talent by which discourse is adapted to its end. The four ends of discourse are to enlighten the understanding, please the imagination, move the passion, and influence the will."
>
> A. Richards: "Rhetoric is the study of misunderstandings and their remedies."
>
> Kenneth Burke: "Wherever there is persuasion, there is rhetoric, and wherever there is rhetoric, there is meaning."

Aristotle wrote a book about techniques of persuasive argumentation, entitled *Rhetoric*. To quote Aristotle:

> Rhetoric may be defined as the faculty of observing in any given case the available means of persuasion.

Aristotle distinguished Rhetoric from other fields of study, like medicine (which deals with what is healthy and unhealthy), or geometry (which deal with the properties of magnitudes), or arithmetic (which deals with numbers). Other fields deal with their special content. Rhetoric involves "the power of observing the means of persuasion on almost any subject presented."

Aristotle broke Rhetoric down into three areas:

> Of the modes of persuasion furnished by the spoken word there are three kinds. The first kind depends on the personal character of the speaker; the second on putting the audience into a certain frame of mind; the third on the proof, or apparent proof, provided by the words of the speech itself.

Today, Aristotle's three parts are called *Ethos*, *Pathos*, and *Logos*. "Ethos" (the Greek word for "character") is the perceived trustworthiness of the speaker. "Pathos" (the Greek word for "suffering" or "experience") is an appeal to an audience's emotions. "Logos" (the Greek word for "word") is an argument based on reason.[263]

In the years since Aristotle, much has been added to Aristotle's analysis of Rhetoric. For example, Rhetoric has been divided into five parts: invention, arrangement, style, memory, and delivery. Aristotle's concepts sometimes seem quaint, or even strange, but his perspective has proven durable, and with the elaborations developed in the Middle Ages, plus the recent additions of communications theory, psychology, and neuropsychology, have created an important body of knowledge regarding effective communication. Aristotle's approach to studying persuasive speech remains relevant today.

A. APPEALS TO ETHOS. In traditional Rhetoric theory, Ethos is persuasiveness attributable to the actual or perceived character of the speaker or writer. Aristotle viewed Ethos as something invented by the speaker and created during the speech. Aristotle commented: "[There is persuasion] through character whenever the speech is spoken in such a way as to make the speaker worthy of credence . . . . And this should result from the speech, not from a previous opinion that the speaker is a certain kind of person."[264] Roman Rhetoricians viewed Ethos differently, for in Rome a person's credibility

and the weight of his words were intertwined with his family history.[265] It is said that Ethos is influenced by the speaker's attitude toward the audience. The attitude can vary from formal to informal, and can vary from time-to-time wihtin one speech. One way that a speaker's attitude is conveyed to the audience is through *tone*. Tone is the feeling the audience perceives about the speaker's attitude. Tone is conveyed through word choice and sentence structure.

B. APPEALS TO PATHOS. Pathos is the approach of swaying the audience by emotional appeal, rather than by logical argument. Such emotions might include love, fear, patriotism, guilt, hate, joy, pity, attraction, etc. Emotional effect is often achieved through vivid and concrete language, emotionally-loaded words, honorific and pejorative words, emotional narratives or anecdotes that bring the issue being considered "to life," metaphors, similes, and symbols that trigger emotional reactions. Some writers include in Pathos appeals to an audience's sympathies, an effort to have the audience identify with the speaker or writer. Many of the Rhetorical Fallacies are in fact tried-and-true effective appeals to Pathos. See Section XV.

While an emotional appeal today is sometimes seen as inferior to intellectual argument, Aristotle did not view it that way. Aristotle saw humans as having a rational element and an emotional element.[266] Since both the intellect and emotions are a part of humanness, any study of persuasion by necessity must attend to the way that speakers and writers can affect emotions.[267]

An explicit appeal to emotions, by telling the audience how to feel, is seldom successful. Instead, the speaker or writer must use techniques to create or re-create situations in which emotions naturally arise.

C. APPEALS TO LOGOS. The Greek word "Logos" has a rich and varied background in the history of ancient philosophy. As used by Aristotle in Rhetoric, "Logos" is an argument that persuades through reasoning, often sequential steps, and often arguing from premises to conclusions. To Aristotle, the typical structure for arguments that appeal to Logos is the Syllogism, which appears in speech in a truncated form that Aristotle calls the "Enthymeme."

1. Syllogism. A Syllogism is a three-pronged deductive argument with two overlapping Premises that lead with certainty to a Conclusion. If the two Premises are proven, then the Conclusion necessarily follows. See Section VII.B.

2. Enthymeme. In the section of this Article relating to Deductive Logic, an Enthymeme was described as a truncated Syllogism or truncated Conditional Proposition in which part or all of one or more of the Premises or Conclusion, or Antecedent and Consequent, is not explicitly stated. It usually has the form of the Conclusion coupled with a reason (typically the Major Premise).[268] In Logic, unlike pure deductive arguments, Enthymemes are not required to lead to the Conclusion with absolute certainty. In Rhetoric, an Enthymeme has an additional aspect. In Rhetoric, an Enthymeme is an argument in syllogistic form that has as its premise a belief or value that the writer or speaker thinks is shared by the audience.[269] These shared beliefs or values are sometimes called "Commonplaces." Aristotle made clear that rhetorical Enthymemes appeal to the rational, not the emotional, part of the audience. But Enthymemes substitute a kind of Informal Logic for formal Deductive Logic developed elsewhere by Aristotle.[270]

(a) Advantages and Disadvantages of Commonplaces. Using Premises that the audience will accept without preliminary

justification avoids the difficulties of proving that the Premises are true. This allows the speaker to move directly into the argument phase in which s/he attempts to persuade the audience that the Premises of the argument leads to the Conclusion. Because many Commonplaces that might be used in an Enthymeme are (i) ill-defined, (ii) true only to a degree or depending on circumstances, (iii) contradict other beliefs or feelings held by the audience, or (iv) may have different effects on different audiences, the process of constructing and winning arguments does not have the clarity of valid Deductive Logic (where true Premises lead by necessity to a correct Conclusion), or even valid Inductive Logic (where a sufficient number of well-chosen particulars support a general principle to an acceptable degree of likelihood).[271]

(b) Selection of Enthymemes. An important and interesting part of Aristotle's writing on Enthymemes relates to the "places" (in Greek *topoi)* where a speaker can go to find Commonplaces to use in an argument. The 300-400 enthymatic topics suggested by Aristotle in his books TOPICS and RHETORIC are only partially relevant for the present time, but recent publications have modernized Aristotle's topics[272] and the Internet gives topic-hunters a limitless number of opportunities to find Commonplaces for Enthymemes. You can search for current events, jokes, quotations, proverbs, maxims,[273] adages,[274] aphorisms, gnomes,[275] paroemia,[276] sententia,[277] quotations from famous persons, and even for lists of enthymatic structures and topics.[278] In legal arguments, the Commonplaces include rules of law, legal maxims, court decisions that have become symbolic (e.g., *Miranda*, *Roe v. Wade*, etc.), iconic documents (e.g., the Declaration of Independence, the U.S. Constitution, the Emancipation Proclamation, M. L. King Jr.'s letter from Birmingham jail, etc.); the list goes on.

3. Sorites. A Sorites in Rhetoric is a concatenated Enthymeme, or a chain of claims reasoned from an original premise to a conclusion. See Section XIV.C.3. A Sorites is needed when there are many steps between the initial premise and the conclusion. The 1961 song popularized by the Kingston Trio, *Where Have All the Flowers Gone*?, is a poetic example of a Sorites Enthymeme.[279]

4. Inductive Inference. Inductive Inference is deriving a probable conclusion about a large number of people or things based on a small number of instances. In modern times, this usually takes the form of test results or surveys that are subjected to statistical analysis to arrive at conclusions. Occasionally, however, when it is necessary to develop a new rule of law (rare) or a new application of existing rules (infrequent), this can be done by inductive reasoning from individual rulings.

5. Analogy. An analogy is a comparison between two different things used to highlight some point(s) of similarity. Linguistically, an analogy sets up a comparison between two items, but does not suggest a total identification, like a metaphor does.[280] From a logical perspective, arguing from analogy is reasoning from parallel cases or parallel fact patterns.[281] The greater and more germane the similarities between the items being compared, the stronger the analogy and the conclusions that can be drawn from it.

6. Simile. A simile is a figure of speech in which two dissimilar things are explicitly compared, usually in a phrase introduced by "like" or "as." Example: "Life was like a box of chocolates; you never know what you're gonna get." See "Metaphor," next section.[282]

7. Metaphor. A metaphor is a figure of speech in which an implied comparison is made between two unlike things that actually have something in common. "The relationship

between simile and metaphor is close, metaphor often being defined as a condensed simile, that is, someone who runs like lightning can be called a lightning runner. Sometimes, simile and metaphor blend so well that the join is hard to find . . . ."[283] From a logical standpoint, metaphors assume the proposition which they are brought to prove. Their use is to make clear and vivid the point that is intended by the metaphor.[284]

8. Aetiologia. "Aetologia" is reasoning that gives a cause or a reason for a statement or claim.

9. Anthypophora. "Anthypophora," or "hypophora," is a figure of speech in which the speaker poses a question, and then answers the question in a definitive tone. It can be done where the question embodies the opposing argument, which is soundly rejected. An example is Winston Churchill's speech of May 13, 1940, regarding war against Germany:

> You ask, what is our policy? I will say: It is to wage war, by sea, land, and air, with all our might and all the strength that God can give us; to wage war against a monstrous tyranny, never surpassed in the dark, lamentable catalog of human crime. That is our policy. You ask, what is our aim? I can answer in one word: Victory, victory at all costs, victory in spite of all terror; victory, however long and hard the road may be; for without victory, there is no survival.

"Ratiocinatio" is like anthypophora, except that it is done internally. It is the mental process of reasoning with oneself by asking questions.

10. Apophasis. "Apophasis" is the process of rejecting alternatives until only the best one is left. This is a form of the familiar "process of elimination."

11. Contrarium. "Contrarium" is juxtaposing two opposing statements in such a way as to prove the one from the other. It is a "figure of opposition."

12. Definitions. A definition is a passage that explains the meaning of a word or term using other words that are more familiar. A persuasive definition is a definition designed to influence the audience's attitudes or feelings about the subject. See Section XXIII.C.12.

13. Epitrope. Epitrope is part of a class of argumentative concessions. With an Epitrope a speaker either pretends to express agreement with an opponent or encourages an opponent to do something that the speaker actually objects to.

14. Expeditio. "Expiditio" is listing all possibilities and then excluding all but one. Also called "process of elimination."[285]

15. Proecthesis. "Proecthesis"is providing a justification at the end of an argument.[286]

16. Prosapodosis. "Prosapodosis" is where the statement of a thing is followed by the antithesis of its cause.

17. Paromologia. "Paromologia" is part of an argumentative class of concessions, where a disputant concedes a weaker point in order to strengthen her/his overall position.

18. Dirimens Copulatio. "Dirimens Copulatio" is the technique of mentioning opposing considerations in order to avoid an argument's appearing to be one-sided. The technique exhibits fairness which increases the speaker's Ethos. It has tactical value, as well. For example, in drafting an appellant's brief, by anticipating your opponent's arguments, you can present them in the worst light while you have the reader's attention, before the

appellee has a chance to present his arguments in the best light.

19. Commoratio. "Commoratio" is emphasizing something by repeating it several times in different words.

20. Hyperbole. "Hyperbole" is a rhetorical device where statements are exaggerated in order to emphasize or achieve an effect.

21. Rhyming. One would think that rhyming would have no place in legal arguments. However, Johnny Cochran used rhyming in his closing argument in the O.J. Simpson murder prosecution, speaking of the state's circumstantial evidence: "If it doesn't fit, you must acquit."[287]

22. Similiarities/Differences. Comparisons and contrasts between things are an important part of Rhetoric. This can be done in an analogy, but also can be accomplished by juxtaposition, parallel construction of the text, etc.

D. THE FIVE CANONS OF RHETORIC. The Five Canons of Rhetoric are invention, arrangement, style, memory, and delivery.

1. Invention. Invention is the process of designing a successful argument. To design an argument, it is important to consider (1) the audience's needs, desires, thoughts, prejudices, etc.; (2) available evidence (facts, testimony, statistics, maxims, examples, laws); (3) appeal to the audience (Ethos, Pathos, Logos); (4) topics; and (5) timing and opportunity, coupled with accurate targeting (Kairos).[288]

2. Arrangement. Arrangement involves putting the argument into an effective order. Rhetoricians have developed a 5-part structure for presentations:

(1) Introduction
(2) Statement of Fact
(3) Confirmation or Proof
(4) Refutation
(5) Conclusion.

The *introduction* not only acquaints the audience with the issues, but it is where the speaker must begin to establish good Ethos. The *statement of fact* lays the foundation for the argument. It also permits the use of Pathos to build emotional support or generate enmity against your opponent. *Confirmation/proof* is the presentation of your argument, that builds on the facts to lead to the conclusion or outcome you desire. *Refutation* is addressing the arguments made, or that you expect to be made, by your opponent. *Conclusion* is where you summarize, and show how the facts and the argument lead to action or inaction on the part of the audience.

3. Style. Style is not about *what* things are said; it is about *how* things are said.[289] Style has been described as the way to "equip one's thoughts with verbal expression appropriate for accomplishing one's intentions."[290] Style has been broken down into virtues, levels, qualities, and figures of speech.[291] The virtues of style are Correctness, Clarity, Evidence, Propriety, and Ornateness. The Roman Orator Cicero described three levels of style, based on the purpose of the speech: to move, to please, and to teach.[292] Rhetoricians have also identified qualities of style.[293] There is a long list of figures of speech.[294]

4. Memory. As a canon of Rhetoric, "memory" describes the ability to deliver a speech without reading it. In former times, those who could speak extemporaneously did; those who could not, memorized. With teleprompters, modern American politicians can feign extemporaneousness or memory. Power Point presentations sometimes serve as the poor man's teleprompter.[295]

5. Delivery. Delivery involves voice, posture, dress, gestures,[296] text, and images.[297]

E. STRUCTURE. The structure of an argument is an important aspect of making the argument clear and persuasive. If the physical structure of the writing reflects the intellectual structure of the argument, then the two structures offer each other mutual support.[298]

1. Appellate Briefs. The arrangement of appellant's brief is set out in TRAP 38.1, of a petition in an original proceeding in TRAP 52.3, of a petition for review in TRAP 53.2, and of a brief on the merits in the Supreme Court in TRAP 55.2. This arrangement is designed to give the appellate court the information it needs in the sequence it needs it. The prescribed arrangement of an appellant's brief is:

- Identity of the Parties
- Table of Contents
- Index of Authorities
- Statement of the Case
- Statement Regarding Oral Argument
- Issues Presented
- Statement of Facts
- Summary of the Argument
- Argument
- Prayer
- Appendix

Many appellate lawyers alter this arrangement while still conforming to it. Examples include: setting out the Issues Presented in the Table of Contents; putting a succinct version of the Prayer in the Statement of the Case, or in the Summary of the Argument, or in the Argument; and putting portions of the Statement of Facts or Argument in the Appendix. The arrangement of the parts of the brief is different from the arrangement of the presentation, which has to do (on the higher end) with the sequence in which information and ideas are introduced, and (on the lower end) with the use of writing techniques such as lists, section headings and subheadings, cross-references, numbering, and sometimes even hyperlinks, to control the path that the appellate court takes through the presentation.

2. Appellate Opinions. Appellate opinions (excluding memorandum opinions) generally fall into three parts: the facts, the law, and the conclusion. Appellate opinions establish premises, then move through the argument to the conclusion. Losing arguments should be identified and refuted or rejected. Where the rule to apply is not clear, or the way a controlling rule should be applied to the case at hand is uncertain, reasoning by analogy to clearer cases may be useful.

3. The Courtroom. In the trial courtroom, the judge is up high and up front. In American courtrooms, everyone looks toward the judge, except for court staff and the witness. The witness is close to the judge. The jury is segregated from other participants by being placed in a box. The legal actors are separated from the audience by the "bar" or rail. All of these placements have practical and symbolic effect. In appellate courts, the bench is elevated, the process is highly structured and counsel speak only from the podium, not counsel table.

F. PUNCTUATION. Punctuation has been described as the marks and signs, used in writing and printing, to separate words into phrases and sentences. This is true, but punctuation does much more when it separates words into phrases and sentences. Punctuation shapes the meaning of the phrases and sentences. Example: The sentence "woman without her man in nothing" can be punctuated "woman, without her man, is nothing," or "woman: without her, man is nothing." The law school story, about the wife who telegrammed her husband for permission to buy an extravagantly expensive bracelet, and he telegrammed back "no price too high," but the telegram company left out the comma

after "no," so she bought the bracelet and the husband later sued Western Union, is a vivid but apparently apocryphal example of how the use of punctuation can even reverse meaning.[299] Professor Lawrence Tribe tells a story about Article I, Section 8, Paragraph 1 of the United States Constitution. The clause says "Congress shall have power to lay and collect Taxes, Duties, Imposts, and Excises to pay the Debts and provide for the common Defense and general Welfare of the United States." Professor Tribe suggests that if the comma had been a semicolon, it would have given Congress "sweeping lawmaking power to 'provide for the general welfare,' which he says would have been "a source of power vastly broader than even the Commerce Clause has ever conferred," a power that would have been "essentially boundless." Professor Tribe says that the chief draftsman of the Constitutional Convention's Committee of Style, Gouvernor Morris, substituted a semicolon instead of a comma, but the semicolon was eventually removed.[300] This story is confirmed in historical publications, but there remains some controversy over whether Morris acted surreptitiously.[301]

In addition to helping to construct meaning, punctuation can also be used to help phrases and sentences convey emotions effectively. So, while the rules of grammar give punctuation the power to affect meaning, we must also remember that punctuation can affect feelings in a way that goes beyond grammar. Thus, punctuation is part of Rhetoric.

- *Period*. A period ends a sentence. It divides ideas into constituent parts. It determines how long a sentence will be, and therefore how easy the sentence will be to understand. It gives a speaker the chance to inhale. It asks the reader to stop and reflect. The biggest problem with periods is that they are not used enough.
- *Comma*. In grammar, a comma has four uses: it separates items in a list; it joins two complete sentences; it indicates the omission of a word; and it acts as the delimiter of a clause. When reading out loud, a comma signals a pause. Commas should be used to avoid amphiboly (ambiguity arising from confusing sentence structure). A comma can separate thoughts in instances where a period would impair the flow of the mind or the voice. Above all, commas should be used to improve clarity.
- *Colon*. A colon signals an explanation. It signals a list. It suggests that support follows for what was just stated. According to Strunk and White: "A colon tells the reader that what follows is closely related to the preceding clauses. The colon has more effect than the comma, less power to separate than the semicolon, and more formality than the dash."[302]
- *Semicolon*. A semicolon is used to connect two sentences that are not joined by a conjunction. It is also used when the second sentence is connected to the first by a conjunctive adverb, such as "however" or "nevertheless." A semicolon is also used to separate parts of a list when a component of the list contains a comma. In joining two sentences, a semicolon is a compromise between a comma and a period. Abraham Lincoln said: "With educated people, I suppose, punctuation is a matter of rule; with me it is a matter of feeling. But I must say I have a great respect for the semi-colo-n; it's a useful little chap."
- *Hyphen*. The hyphen is used to break up compound words that would otherwise be hard to understand (one-of-a-kind). Hyphens are used in numbers under a hundred, and when a word is divided at the end of a printed or typed line. Hyphens are used when a "compound modifier" is used before a noun (e.g., computer-based records). Joining two words with a hyphen can be used, like a metaphor, to cause the

audience to juxtapose different concepts that are brought together by the hyphen.

- *Bullet*. A "bullet" is an elevated dot on the left extreme of a word or phrase, used to indicate membership in a list. Bullets are used when numbering the list is not important or would be distracting. Bullets lend emphasis to the individual items in a list more effectively than joining the concepts in a sentence, separated by commas or semi-colons.
- *Dash.* A dash interrupts the grammar of a sentence. It can enclose a parenthetical statement. It can connect two independent clauses. It can connect a phrase to the rest of the sentence. A hyphen joins; a dash separates.[303] Strunk and White say: "A dash is a mark of separation stronger than a comma, less formal than a colon, and more relaxed than parentheses."[304] A dash, like a pause, emphasizes what follows.
- *Parentheses*. Parentheses are used for numbers in a numbered list, or to segregate an interjected explanatory remark or an aside from the main flow of the sentence in which it appears. They can also be used to signify plurals (e.g., "one or more person(s)"). Parentheticals can be used effectively for disambiguation. They can be used to establish an equivalency (i.e., a definition), or to give an example (to-wit: this), or to exclude certain meanings (but not others). A parenthetical is like a speaker's "aside" to the audience.
- *Brackets*. "Square brackets" (i.e., [ ]) are used to signify the inclusion of material in quoted text by someone other than the quoted person. In this Article, "angle brackets" (i.e., < >) are used to delimit a URL citation to a World Wide Web page.
- *Asterisk*. An asterisk is used as a cross-reference mark to indicate further explanation at the bottom of the page. It is like an unnumbered footnote, but you are limited to one per page. Asterisks are also used like "bullet points" in a list, and as omitted letters in profanity.
- *Apostrophe*. An apostrophe is used to indicate a contraction or a possessive. Contractions are informal speech, and detract from the seriousness of the writing.
- *Question Marks*. A question mark signals a question. In a parenthetical, it reflects uncertainty about a date, name, etc. In persuasive speech, it signals a Rhetorical Question. See Section XIV.M.
- *Slash*. A slash mark is a separator (e.g. "and/or"). It sometimes replaces an "and."
- *Indentation*. Indentation is commonly used at the start of a paragraph, and also to differentiate lists and block quotations from regular text.
- *Quotation Marks*. Quotation marks signal the use of another's words. They also signal a special meaning for a word or phrase. They also can be used to disparage a word or phrase used by your opponent (called "scare quotes"--example, "his only 'authority' for this extraordinary assertion is a unpublished opinion").
- *Ellipsis*. An ellipsis signals an omission from a quotation. It also invites a reader to stop, and dwell on a thought, before going forward. It also can represent an interval of time, setting up a dramatic pause.
- *Footnotes*. A footnote is a super-scripted and numbered cross-reference that directs the reader to the bottom of the page for further information. Footnotes can cross-refer to other footnotes more easily than text can cross-refer to other text. The legal community is divided on the desirability of using footnotes in legal writing. Some readers consider it to be a distraction to have to look at the bottom of the page to see supporting authority. Others prefer to read the main ideas in the text without having to read or skip through citations. Without a doubt, however, footnotes allow the writer more freedom to give explanatory remarks and more extensive references to underlying authority.
- *Endnotes.* Endnotes are footnotes placed at the end of the document. Readers who find

footnotes to be a nuisance will find endnotes aggravating. Endnotes are used in this Article because the article would be unreadable if citations to sources, with URLs, were in the main text. Endnotes also were used instead of footnotes, in this Article, to respect the convention that continuing legal education articles are less formal than footnote-rich law journal articles, while still providing the utility of footnotes.

G. EMPHASIS. Emphasis, sometimes called "accent," can be used to give more importance to some words than others, with the effect sometimes operating at a subconscious level. There are ways to emphasize in writing,[305] and ways to emphasize verbally. An excessive amount of emphasis blunts the effect of all emphasis and irritates some readers or listeners.[306] When written emphasis appears in a quotation, to avoid ambiguity it is necessary to indicated in brackets whether the emphasis was in the original or was added [Emphasis added]. Emphasis in verbal speech is an important component of the communication. Written emphasis in some senses is an effort to translate into the written word the emphasis so readily accomplished in verbal speech.

Oral

- *Loudness*–one can emphasize by speaking the first syllable of the word more loudly than others. Words or even entire phrases can be spoken more loudly for emphasis.
- *Repetition*–repetition can emphasize (e.g., "this is really, really important").
- *Softness*–speaking more softly can be a form of emphasis. If not too frequent or too prolonged, speaking softly inclines the audience to listen more attentively to catch the words.
- *Speed*–speaking a word or phrase more slowly than the rest emphasizes.
- *Pitch*–you can change your pitch ("modulation") for emphasis, to get attention, to distract.
- *Pause*–pauses can be used at the start of a speech, or right before or after an important point,
- *Silence*–silence preceding or following an important point can be used for emphasis.
- *Movement*–moving while speaking, or moving and then stopping, can be used for emphasis.
- *Placement*–placement of speakers in different locations can signify importance. A lawyer standing behind his/her client in closing argument is emphasis.
- *Inflection*–alteration in the pitch or tone of the voice.
- *Accent*–accent, or emphasis, can be used to stress certain words. It is sometimes used in a way that changes the meaning, even though the words remain the same.
- *Mimicry*–mimicry is using the voice and tone of another person. This can be funny, but it can be disrespectful and thus damage Ethos.
- *Cadence*–a slight falling in pitch of the voice in speaking or reading, as at the end of a declarative sentence.
- *Body language*–gestures can be used for expression or for emphasis. Posture, body tilt, turning the head, turning the body, moving the eyes, smiling, frowning–all can be used for emphasis.
- *Interruptions*–interruptions can be used to emphasize, whether they are staged or spontaneous.

Written

- *Italics*–italics gives light emphasis to words.
- Underscore–underscoring is used for emphasis, probably left over from the days of typewriters that could not type italics. When used for emphasis, underscoring falls between italics and bold in strength. Underscoring is often used to differentiate paragraph headings (see for example, this

very paragraph) and, in an appellate brief, underscored paragraph headings can be presented in the table of contents of an appellate brief to show the reader a lower level of the structure of the presentation.

- **Bold**–bold gives heavy emphasis to words. Bold can also be used to differentiated paragraph headings from ordinary text.
- ALL CAPS–All caps, or upper case letters, emphasizes a word or phrase. Words that are entirely upper case are more difficult to read than normal text. Upper case is sometimes considered the written version of shouting, and thus should be used sparingly.
- Exclamation Point! – An exclamation point suggests surprise or shock (and when spoken–a shout). Excessive use of exclamation points is considered to be amateurish and tiresome; so are doubled and tripled exclamation points.[307]
- Color–changing color can be used for emphasis, and is often used that way on World Wide Web pages.
- Centering–Centering on a line is an important way to emphasize a phrase, or an idea. Centering is frequently used in appellate briefs, to signify the section headings for different parts of a brief.
- Repetition--Repetition can be used for emphasis. Repetition can be used for effect. Consider the emphasis imparted by repetition in the apocryphal statement, "The three most important things about real estate are: location; location; location."[308] President John F. Kennedy used repetition for effect in his June 26, 1963 speech in Berlin, where he repeated the phrase: "Let them come to Berlin."[309]
- Question--A Rhetorical Question can be used for emphasis. Example: "Can this be right? Does this mean what it says? Who do they think they are? Are we going to let them get away with this?"

Choice of Words

- Nouns–Nouns, with their associated verbs, are the building blocks of a sentence. In an appellate brief, the nouns are mostly supplied by the underlying facts. However, in discussions of hypothetical propositions and in analogies, the writer is free to use nouns chosen for effect. A careful selection of new nouns can be an effective persuasive device.
- Euphemisms–A euphemism is an inoffensive word or phrase substituted for one considered offensive or hurtful. The Rhetorical term is "paradiastole," which is the use of euphemism to soften the impact of a vice or virtue. Euphemisms are often used for certain body parts, procreation, excretion, disabilities, death, and other topics that make people uncomfortable, etc. Example: "health" insurance is really sickness insurance; "life" insurance is really death insurance. "Meiosis" is an euphemism that downplays or understates something.
- Litotes--A figure of speech consisting of an understatement in which an affirmative is expressed by negating its opposite. Example: "The grave's a fine and private place, But none, I think, do there embrace." Andrew Marvell, *To His Coy Mistress*. Example: "We made a difference. We made the city stronger, we made the city freer, and we left her in good hands. All in all, not bad, not bad at all." Ronald Reagan's Farewell Address to the Nation, January 11, 1989.
- Pronouns–A pronoun takes the place of a noun. There are personal pronouns,[310] demonstrative pronouns,[311] relative pronouns,[312] indefinite pronouns,[313] interrogative pronouns,[314] possessive pronouns,[315] and reflexive pronouns.[316] Pronouns are the bane of clear writing. There is often confusion as to what the antecedent referred to by a pronoun maybe. Using nouns in that situation can avoid this confusion. Pronouns (along with the passives "his" and "her") can confound the writer who is sensitive to the female

reaction to the use of the male pronoun to apply to both genders. Won't someone invent a neutral gender to rid us of this problem?

- Possessives–A possessive noun or pronoun indicates that the following word belongs to the possessive noun or pronoun. When an inanimate object is given a possessive, it can suggest personification. There are complicated rules for making possessives out of words ending with different letters. It is easy to miss the proper form with possessives, which may cause some readers to think you don't know grammar, and therefore are not knowledgeable on the topic you are espousing.
- Adjectives–An adjective is used to modify a noun or pronoun, giving more information about the word that is modified. Adjectives can be used argumentatively, to enhance or diminish the nouns they modify. If used too argumentatively, adjectives can detract from the sense of decorum and fairness that help to support the speaker's or writer's Ethos.
- Intensifiers–An "intensifier" is a word that adds no meaning to a sentence but instead serves to magnify the meaning of the word or phrases it modifies. Examples are "very," "extremely," "clearly," "obviously," etc.
- Verbs–A verb is a word that conveys action or a state of being. Verbs can be selected that have emotional content and persuasive effect.
- Adverbs–Adverbs modify any part of language other than nouns (which are modified by adjectives). Adverbs can modify verbs, adjectives, other adverbs, clauses, etc.
- Verb tenses–English has three main tenses: past, present, and future. Each has a progressive form (ongoing action), a perfect form (completed action), and a perfect progressive form (ongoing action completed at a definite time). The pluperfect tense is a past act completed before another past act. Using past, present, and future tenses lends to clear, declarative writing. Other tenses are more complicated but in certain situations more accurate.
- Verb moods–The mood of a verb suggests the manner in which an action or condition is conceived by the speaker. The three moods in English are indicative (stating a fact or asking a question), imperative (a command), and subjunctive (doubt, desire, supposition, or condition contrary to fact). The choice of mood is a subtle but powerful way to convey secondary meaning to the reader.
- Quotations–When citing supporting authorities, quotations can eliminate the necessity that the reader look up and read the cited material. Well-written quoted materials can be more persuasive than words the author might choose to express the same idea. Quoted contractual provisions or quoted testimony can be more effective than a record reference in a brief.
- Paraphrase–A paraphrase is a reconstruction of a quotation. While a pithy quotation is better than an excellent paraphrase, sometimes it is not possible to find a pithy quotation that conveys the point you want to make. Chopping up a verbose quotation with elipses introduces doubt as to whether the quotation fairly reflects the original statement. If the brief-writer can do a better job of conveying the message than the original writer being quoted, then paraphrase. On balance, a good paraphrase is better than a poorly-phrased quotation.
- Jargon–Jargon is vocabulary, associated with a topic, group, trade, profession, and the like, that has a special meaning. Jargon tends to develop into short-hand terms or acronyms that are unintelligible to the uninitiated.
- Slang–Slang is a manner of speaking, typically in private conversations, using an informal vocabulary. Much slang contains elements of sexuality, humor, irreverence, disrespect of social conventions, and the like. Some slang is like jargon, using words that are incomprehensible to the general

public. Slang is usually avoided in formal writing and speaking.
- Profanity–Profanity is verboten in formal writing and speaking. If quoting a witness who used profanity, the profanity should be used delicately, so that the negative impression the profanity creates is not attributed to the writer. Substituting asterisks for internal letters can soften the effect. Example: "sh*t happens." A popular euphemism: "he used the F-word".

H. CITATION SIGNALS. When citing legal authority in support of a statement in a brief or appellate opinion, "citation signals" can be used to indicate the degree of support that the cited authority gives to the statement. The citation signals are:
- [No Signal] indicates direct support.
- "e.g." indicates that the cited authority is one of several examples that could be cited.
- "accord," used after the primary authority, means that the cited authority agrees with primary authority; "accord" is also used when citing legal authorities from another jurisdiction.
- "see" is used instead of "no signal" when the authority does not explicitly support the statement, but supports it in principle, or when the support is in dictum.
- "contra" is used when the cited authority directly contradicts the statement.
- "but see" is used like "see," but when the authority is generally to the contrary.
- "see generally" is used to cite background materials that are relevant but do not provide direct support for the statement.
- "compare with" or "cf." (which means "compare" in Latin) indicates that value can be derived from comparing the indicated authorities to one another. This citation signal requires a parenthetic explanation to explain what the comparison shows.

I. LEGALESE. Lawyers are victims of the fact that their first exposure to legal writing in law school is to significant but old appellate opinions written in a somewhat archaic style by judges selected on some basis other than the clarity of their writing. Most cases are chosen for casebooks because of the legal proposition decided, and not the quality of the writing. Today's appellate judges universally condemn legalistic writing in the briefs they have to read (what about in the opinions they have to write?). Antonin Scalia: "[Too many lawyers believe that] it is essential to legal English that one write as pompously as possible, using words and phrases that have long since disappeared from normal English discourse.''[317] Words to avoid include: whereas, hereby, herein, hereinabove, hereinbefore, hereinafter, hereto, therefor, therefrom, therein, thereof, therewith, to wit, unto, vis-à-vis, viz., whereby, and wherein. Replace "said," "such," "aforecited," "aforementioned," "aforesaid" with "the," "this," or "these." The words "forthwith," "herewith," "and/or" can be made more exact. There are a number of sources of suggestions on good legal writing style.[318]

J. FIGURES OF SPEECH. A "figure of speech" is a rhetorical device that achieves a special effect by using words in distinctive ways. The figure of speech could be a word that is used in a way that diverges from its normal meaning, or a phrase that has a specialized meaning not based on the literal meaning of the words in it. Figures of speech also include well-known techniques of arranging and presenting words or concepts for special effect. Hundreds of figures of speech have been identified, although only a few are routinely used in modern times. Figures of speech include: *alliteration* (repetition of an initial consonant sound), *allusion* (an unstated reference to another well-known writing), *anaphora* (repetition of the same word or phrase at the beginning of successive clauses or verses), *anastrophe* (inversion of the usual word order), *antithesis* (juxtaposition of contrasting ideas in balanced phrases), *anticlimax* (arranging words in order

of decreasing importance), *antithesis* (juxtaposing opposing or contrasting ideas), *apophasis* (invoking an idea by claiming not to invoke it), *aposiopesis* (interrupting speech for dramatic or emotional effect), *cacophony* (juxtaposing words in a way that produces a harsh sound); *chiasmus* (a verbal pattern in which the second half of an expression is balanced against the first, but with the parts reversed), *climax* (arranging words in order of increasing importance), *dysphemism* (the substitution of a more troubling or offensive word for another more innocuous word), *enumeratio* (amplifying a topic by dividing it into parts, and detailing them), *euphemism* (the substitution of an inoffensive term for one considered too harsh or explicit), *hyperbole* (the use of exaggerated terms for the purpose of emphasis or heightened effect), *innuendo* (a secondary meaning of a statement that differs from the primary meaning), *irony* (the use of words to convey the opposite of their literal meaning, or making a statement or describing a situation that implies the opposite of what appears on the surface), *juxtaposition* (presenting two things together so as to suggest similarities or differences), *litotes* (an understatement in which an affirmative is expressed by negating its opposite), *metaphor* (an implied comparison between two dissimilar things that suggests that they have something in common), *metonymy* (where one word or phrase is substituted for another with which it is closely associated, or describing something indirectly by referring to things around it), *onomatopoeia* (words that imitate the sounds associated with the objects or actions they refer to), *oxymoron* (incongruous or contradictory terms that are joined together), *paradox* (a statement that appears to contradict itself but can sometimes be reconciled at a deeper level), *personification* (where an inantimate object or abstraction is endowed with human qualities or abilities), *pun* (a play on words, sometimes on different senses of the same word and sometimes on the similar sense or sound of different words), *simile* (a comparison, usually formed with "like" or "as," between two dissimilar things), *repetition* (using a word or phrase again and again for emphasis or to establish correlations between different parts of a speech or writing), *rhetorical question* (making a statement by way of posing a question), *sine dicendo* (a statement so obvious that it is self-evident), *synecdoche* (a description where a part is used to represent the whole, and vice-versa), *understatement* (where a writer or a speaker deliberately makes a situation seem less important or serious than it is).[319]

K. NARRATIVE. A narrative is story told as a sequence of events, usually presented in chronological order. Narrative has particular appeal to an audience, since most books, movies, and television dramas are narratives. Narrative theorist Porter Abbott said that "narrative is the principal way in which our species organizes its understanding of time."[320] "Narrative structure" is the structural framework that underlies the order and manner in which a narrative is presented. Narrative structure consists of fabula and sujet (sometimes called "story" and "narrative" respectively). "Fabula" is the underlying story, the order in which the actual events transpired. "Sujet" (also "sjuzhet") is the order in which the events are told, which may be but need not be chronological.[321] Abbott commented:

> The juxtaposition of the two kinds of time makes the difference clear. Clock time, like other forms of abstract or regular time, always relates to itself, so that one speaks in terms of numbers of seconds (minutes, hours) and fractions (nanoseconds). Narrative time, in contrast, relates to events or incidents.[322]

"Progression" is the movement of a narrative from beginning to end and the principles governing that movement.[323] It is important to recognize that the same story can be narrated

in different ways, with different results. Designing a narrative for use in a brief or speech is very much a Rhetorical process. The facts can be ordered chronologically, but decisions must be made about what facts to include and what to omit from the narrative. In a legal argument, inclusion and exclusion may be dictated by the legal theories or by the desired outcome. There are many narrative patterns ("grand narratives") that audiences will be able to consciously or unconsciously identify with (e.g., Adam and Eve, David and Goliath, Jesus of Nazareth, the Pilgrims and Thanksgiving, 1776, Sleeping Beauty, Cinderella, cowboys and Indians, the voyage of discovery, the murder mystery, to name a few). As Aristotle taught regarding the use of Enthymemes that will be familiar to the audience, so the Commonplaces of Rhetoric include the grand narratives and meta-narratives that percolate through our society. In making a legal argument, the way the case is narrated can be an important part of persuasive effect. If the argument inherently involves abstractions, then perhaps examples can be used imbue the argument with the qualities of a narrative.

L. CONTRAST. Contrast can be a powerful tool in constructive sentences and constructing arguments. Abraham Lincoln said: "You may fool all the people some of the time, you can even fool some of the people all of the time, but you cannot fool all of the people all the time." Winston Churchill said: "Never in the field of human conflict was so much owed by so many to so few." Charles Dickens began A TALE OF TWO CITIES with this sentence:

> It was the best of times, it was the worst of times; it was the age of wisdom, it was the age of foolishness; it was the epoch of belief, it was the epoch of incredulity; it was the season of Light, it was the season of Darkness; it was the spring of hope, it was the winter of despair; we had everything before us, we had nothing before us; we were all going directly to Heaven, we were all going the other way.

M. TYPES OF QUESTIONS. Questions play a variety of important roles in persuasive speech and writing. Questions have been divided into categories, discussed below.

1. Loaded Question. A loaded question, sometimes called a "plurium interrogationum," is a question that is structured so that the answer will impliedly confirm a tacit assumption that is built into the question. The classic example is the question: "When did you stop beating your wife?" This question tacitly assumes that you have a wife that you have beaten. The best defense is to directly address the tacit assumption. An example would be: "I am not married," or "I love my wife and I would never beat her." Or the answer could be humorous: "Sir, if you knew my wife, you would not ask that question." A bad answer would be: "How I discipline my wife is none of your business." A loaded question has been called a "misleading question," or a question that contains a "false supposition."[324] A noted example occurred when Lesley Stahl, an interviewer on the television program *Sixty Minutes*, asked US. Ambassador to the U.N. Madeleine Albright the following question about economic sanctions in effect against Iraq: "We have heard that half a million children have died. I mean, that is more children than died in Hiroshima. And, you know, is the price worth it?"[325] Ambassador Albright responded, "I think that is a very hard choice, but the price, we think, the price is worth it." While there was little public outcry in the United States over the answer, it received much negative press in the Middle East. She was nonetheless later confirmed as President Clinton's Secretary of State. In her memoirs, Madame Secretary said:

> I must have been crazy; I should have answered the question by reframing it and pointing out the inherent flaws in the premise behind it. Saddam Hussein could have prevented any child from suffering simply by meeting his obligations.... As soon as I had spoken, I wished for the power to freeze time and take back those words. My reply had been a terrible mistake, hasty, clumsy and wrong. Nothing matters more than the lives of innocent people. I had fallen into the trap and said something I simply did not mean. That was no one's fault but my own.[326]

2. Leading Questions. A leading question is a question that suggests the answer that the questioner desires. In Texas court proceedings, Tex. R. Evid. 611 prohibits leading questions on direct examination but permits them on cross-examination. Outside the courtroom, leading questions can invalidate a forensic interrogation. Dr. Elizabeth Loftus has published research suggesting that leading questions can implant false memories in examinees.[327]

3. Rhetorical Question. A rhetorical question is a question posed in a speech in order to set up an answer that the speaker will provide. Some rhetorical questions are posed for the audience to provide its own answer. Example: "Why would anyone want a child to have no health insurance?" The foregoing question is a form of Reductio ad Absurdum. An apocryphal historical example is King Henry II's rhetorical question: "Who will rid me of this troublesome priest?" which resulted in Archbishop Thomas Becket's assassination. Chief Justice Roberts used forty Rhetorical Questions in his dissent in *Caperton v. A.T. Massey Coal Co.*,[328] to attack the subjectivity of the standard for when judicial recusal would be constitutionally required for campaign contributions. Justice Roberts' rhetorical device is also called a "parade of horribles," where the speaker argues against a course of action by listing a number of extremely undesirable events which will ostensibly result from the action.

4. Speaking Questions. A "speaking question" is a question that purports to solicit an answer when the real purpose is to assert a proposition regardless of the answer. Example: "Isn't it true, Sir, that you intended to provoke an angry reaction from my client?" The obvious answer is "no," but the real effect of the question is to suggest a "yes" answer despite the expected denial. Skilled trial advocates can conduct a cross-examination where the insinuations in the questions can make a point even when the witness answers all the questions "no".

5. "Buttering Up" Questions. "Buttering-up" occurs when a two-step question is asked, the first part of which is designed to lead the questionee to answer yes to the second part of the question. For example: "Would you be a dear and hand me my glasses?"

6. A "Hook" Question. A hook question is designed to cause the questionee to engage in a dialogue. For example, a man standing on 46th Street in New York City approaches a tourist and asks "Can I help you find something?" when his real purpose is to engage the passer-by in conversation in order to direct the passer-by into a particular jewelry store to buy diamonds.

N. TENSE, MOOD, AND VOICE OF VERBS.

1. Tense. The tense of a verb is the time frame in which the action took place: past, present, or future. There are four ways to state each tense (past, progressive, perfect, and perfect progressive), and three "aspects" (indefinite, complete, and continuing).[329]

2. Mood. In English there are four moods of verbs: the indicative mood, the imperative

mood, the subjunctive mood, and the infinitive. The indicative mood is the most common, and is used to make an unqualified assertion of fact or opinion. The imperative mood is used to give orders or to make requests. The subjunctive mood is used to state a hypothesis, a contingency, something that is contrary to fact, a wish, and often appears in a clause beginning with the word "if." The infinitive is used with other verbs to create tense and mood.

3. Voice. English sentences have the active or passive "voice." In the active voice, the subject acts through the verb upon the object of the sentence. In the passive voice, the object of the sentence receives the action of the verb from the subject. In some passive voice sentences the subject is omitted. While the meaning of the sentence is the same, the passive voice leads to a more round-about way of saying things, that can reduce clarity. The active voice emphasizes the subject or even the action in the sentence, while the passive voice emphasizes the object and de-emphasizes the subject of the sentence. There are times where you want to de-emphasize the actor, as in a criminal trial where the defendant says "the the gun went off," or in a car wreck case when the defendant says "then the car spun out of control." President Lincoln used the passive voice in his statement to Congress justifying his suspending the writ of habeas corpus. See Section VII.L.13. More recently, Texas Governor Rick Perry, on May 3, 2010, talking about the British Petroleum oil spill, said: "From time to time there are going to be things that occur that are acts of God that cannot be prevented." His statement de-emphasized British Petroleum's involvement in the well blow out and assigned the role of the acting agent to chance or the Diety. There are times when the actor is unimportant (e.g., "the mail was delivered late today"). There are times when the actor is unknown (e.g., "the fire started at 3am" or "the cat was run over during the night"). And there are times when there is no actor (e.g., "it rained").

William Strunck Jr., author of THE ELEMENTS OF STYLE, wrote in 1918 that "[t]he habitual use of the active voice . . . makes for forcible writing."[330] Contrast "I will always remember the first time we met" to "the first time we met will always be remembered by me." As the professor succinctly put it to the student: "Don't tell me you're sorry the paper was poorly written; tell me you're sorry you wrote a bad paper."

O. KAIROS. "Kairos" is an important ancient Greek word that had different meanings at different times. Kairos first appears in Homer's *Iliad*, to describe a vital or lethal vulnerability in the human body.[331] When used by Aristotle in connection with Rhetoric, Kairos had the sense of the "right" or "opportune" moment to enter a conversation, or to make a point in a debate. Kairos goes beyond "*what* to say" or "*how* to say it" and considers "*when* to say it." While Kairos was for a very long time an overlooked part of Rhetoric, a few modern writers have written about it with interest. Carl Glover combined physical vulnerability with timing when he said: "The archer must exercise 'due measure and proportion' in aiming the arrow and drawing the bow string; he must hit a 'vital part of the body' to fell his prey; he must release the arrow at the 'exact or critical time' to strike a moving target."[332] Glover's conception involves not just timing, but also knowing where to strike to land a decisive blow. Anyone who has worked on a committee knows that the timing of when statements are made in a committee meeting can influence the direction that a committee takes. Also, the opportunity to make a comment at a certain point in the discussion can expire, as the discussion moves on to a different topic.

In a larger sense, Kairos applies to the appropriateness of Ethos, Pathos, and Logic, since the appropriateness and effectiveness of appeals to the audience depends on the temper of the times. For example, Marxist rationales were ahead of the times when Marx wrote them, were influential among intellectuals and third-world political leaders from 1917 to the 1970's, and are essentially dead letter at the present time.

XV. FALLACIES OF ARGUMENTATION. Some arguments are fallacious because their underlying logic fails to adhere to the rules of deductive or inductive reasoning. Logical Fallacies are discussed in Sections VII.B.10 (syllogistic), VII.K (deductive) and VIII.F (inductive). Then there are arguments that are fallacious because of problems with word meanings, syntax, and semantics, or because they divert the focus of the audience from the merits of the dispute to irrelevant considerations. These latter types of argument are called "Fallacies of Argumentation." While Logical Fallacies are clearly flawed, Fallacies of Argumentation are right or wrong in degrees, depending on the content of the argument and the context of the argument.[333]

Spotting Rhetorical Fallacies in everyday language is sometimes difficult because many of these techniques are so familiar that we have become used to them. The best antidote is to become familiar with a list of Rhetorical Fallacies, to be better able to spot one when it arises. Sometimes fallacious arguments are made out of ignorance. However, many fallacious rhetorical techniques are used precisely because they are effective in obscuring the merits of an argument. Since the goal of Rhetoric is persuasion and not adhering to Logic, or speaking the truth, many areas of discourse are prone to fallacious techniques, including political propaganda, international diplomacy, advertising, editorials, news programs that appeal to particular constituencies, and, unfortunately, legal advocacy.

In appellate court opinions, the term "fallacy" is often loosely used to characterize a position as being generally illogical, or sometimes wrong for any reason. This use of the term "fallacy" is so loose that it is connected to traditional fallacies only in the sense that the user seeks to add the historical weight of the word "fallacy" behind his criticism of a contrary position, even when the reasoning being criticized is not truly fallacious.

There are many lists of Rhetorical Fallacies available on the worldwide web, and the categories and individual items in these lists are somewhat subjective and can amount to shades of grey. Latin names were introduced for many fallacious arguments in the Middle Ages, and are mentioned where applicable. The following list contains the major Rhetorical Fallacies, but by no means all of them.

1. Accident. The Fallacy of Accident, also called "Destroying the Exception" or "Sweeping Generalization," occurs when one attempts to apply a legitimate general rule to an irrelevant situation that should be recognized as an exception to the general rule. "Guilt by association" is an instance of the Fallacy of Accident.

2. Ambiguity. The Fallacy of Ambiguity arises when a word used in an argument has more than one meaning, and the intended meaning is unclear. When someone intentionally creates an Ambiguity, in order to gain from the uncertainty of meaning, it is called "Equivocation."

The Fallacy of Ambiguity was mentioned in *Powers v. Texas Mut. Ins. Co.*, 2010 WL 337144, *4 (Tex. App.--Eastland 2010, no pet.) (memorandum opinion), the court said:

Powers's challenge on appeal is that the blood alcohol test results should not have been admitted as evidence because there were gaps in the chain of custody; therefore, the expert opinions of Dr. Avery and Hambrick that relied on the blood sample should have been excluded. Powers cites *Gammill v. Jack Williams Chevrolet, Inc.*, 972 S.W.2d 713, 726 (Tex. 1998), for the proposition that expert testimony is unreliable if "there is simply too great an analytical gap between the data and the opinion proffered." The part of his argument that relies on *Gammill* commits the fallacy of ambiguity (equivocation). The "gap" referred to in *Gammill* is one of analytical reasoning. The "gap" challenged here is whether the chain of custody from the time the blood sample was taken until it was analyzed by Hambrick was established by the evidence; it was not a "gap" in an expert's analytical reasoning.

3. Amphiboly. "Amphiboly" (from the Greek "ampho," which means "double" or "on both sides"), also called "amphibology," occurs where an ambiguity arises not from the unclear meaning of one word, but rather from the way the words are arranged. There are many humorous examples:

- "Toilet Out Of Order ... Please Use Floor Below"
- "Automatic Washing Machines: Please Remove All Your Clothes When The Light Goes On"
- "After Tea Break Staff Should Empty The Teapot And Stand Upside Down On The Draining Board"
- "I cannot praise her work too highly."
- "If you attack the Persians, you will destroy a mighty empire."[334]

Ambiguity and Amphiboly should be distinguished from Vagueness. Vagueness is an indistinctness of meaning.

4. Appeal to Authority (ad Verecundiam). An appeal to authority is an argument that a proposition should be accepted or rejected because a person in authority has accepted or rejected the proposition. This argument is fallacious when there is no necessary connection between who the person is and the correctness of her views. It is not objectionable to suggest that opinions of authoritative persons support a view; the problem is in arguing that such opinions establish the point. The fallacy was identified by John Locke, who wrote: "When men are established in any kind of dignity, it is thought a breach of modesty for others to derogate any way from it, and question the authority of men who are in possession of it."

This technique is evident in advertising when claims are made like: "According to a nationwide survey: More doctors smoke Camels than any other cigarette;" or "Trident is so good for your teeth that 4 out of 5 dentists would recommend Trident sugarless gum for their patients who chew gum."

The Fallacy of Appeal to Authority has two manifestations. First, the person held up as an expert may be well-known but not an expert in the subject matter in question. Celebrity endorsements of products or services are a form of this fallacy, as are health product advertisements with actors wearing white coats and stethoscopes hanging around their necks. On June 9, 2010, actor Kevin Costner testified to a committee of the U.S. Congress on the oil spill in the Gulf of Mexico.[335] Since 1969, more than 400 celebrities have appeared as witnesses in 288 congressional committee hearings.[336] A second problem occurs with an Appeal to Authority when the authority is an expert in the area, but his/her opinion may be flawed due to bias, corruption, inaccuracy, etc. This concern has driven the scientific research community to require disclosure of researchers' ties to parties who are financially

interested in the results of the study, and to treat undisclosed connections as a scandal.

The revolution in the role of expert witnesses ushered in by the *Daubert* case[337] involves the very issues raised by this fallacy. Experts must now back up their opinions with reliable data and valid technique. As stated by the court in *Burrow v. Arce*[338]: "it is the basis of the witness's opinion, and not the witness's qualifications or his bare opinions alone, that can settle an issue as a matter of law; a claim will not stand or fall on the mere ipse dixit of a credentialed witness." Will Rogers put it this way: "An economist's guess is liable to be as good as anybody else's."

An Appeal to Authority is not fallacious when a legal argument relies on binding case precedent, although the argument is fallacious if the authority is not binding because the authority is dictum, or a plurality opinion, or has been attenuated by the amendment of an underlying statute, etc.

5. Appeal to Belief. An Appeal to Belief is an argument that because many people believe an argument, it is therefore true. It takes the form: "Many people believe X; therefore, X is true". Depending on the issue, the fact that something is widely believed may make the view important for practical reasons, but doesn't establish the truth of the belief. Over history, a majority of the people have at times believed something we now know to be false, like a flat earth, or a geocentric universe, or that Columbus was the first European to discover America.

6. Appeal to Emotion. The Appeal to Emotion Fallacy occurs when an arguer appeals to the audience's emotions rather than reason in order to persuade. This Fallacy is prevalent in political speech and in commercial and political advertising. Indicators of an appeal to emotion are concepts or symbols that engender strong feelings, like patriotism, racism, religious fervor, pity, etc. Non-verbal symbols can be used as latent components of an appeal to emotion, like patriotic or religious music, a national flag, a religious symbol, persons of certain age, race, or gender, positioned behind the speaker's podium for effect, etc.

7. Appeal to Fear (ad Baculum). The Fallacy of Appeal to Fear occurs when the speaker attempts to provoke fear in support of an argument when the fear is unrelated to the merits of the argument.[339] It is an argument that uses explicit or implicit threats or otherwise causes fear in order to gain acceptance. Example: "You'd better agree with me, or else . . . ."

8. Appeal to Flattery. An Appeal to Flattery is an attempt to persuade a listener by flattering or complimenting the listener. Such an appeal is unrelated to the merits of the claim.[340]

9. Appeal to Novelty. An Appeal to Novelty occurs when it is argued that something should be accepted because it is new.[341] Just because an idea or process is new does not make it better than existing ideas or processes. Advertisers have found, however, that advertising a product as "new" resonates with consumers.

10. Appeal to Pity (ad Misericordiam). An Appeal to Pity occurs when someone tries to engender support or opposition by invoking pity among the audience.[342] The argument is fallacious when the feeling of pity is extraneous to the merits of the argument.

11. Appeal to Ridicule. An Appeal to Ridicule, or Appeal to Mockery, is an argument designed to persuade by ridiculing or mocking the opponent.[343]

12. Appeal to Tradition. An Appeal to Tradition is an argument that something

should be supported or rejected based on tradition, or the way things have always been done.[344]

13. Argumentum ad Hominem. An "ad Hominem" argument is an argument that attacks an idea by attacking its proponents on irrelevant grounds. The term "ad Hominem" means "against the man." The structure of an ad Hominem attack is:

> Person A makes claim X.
> Person B discredits person A.
> Therefore, person A's claim should be rejected.

Example: unwarranted attacks on the integrity of opposing counsel are improper, and are sometimes held to be incurable error. *See Amelia's Auto., Inc. v. Rodriguez*, 921 S.W.2d 767 773-774 (Tex. App.–San Antonio 1996, no writ) (asking a party if he knew that his lawyer was a convicted felon and had been disbarred for five years for filing a frivolous lawsuit, was incurable error).

A "direct" ad Hominem attack is a personal attack on the opponent, including an attack on her/his character. The structure of the attack is: "Person A has a certain negative quality or feature; therefore, Person A's argument should be rejected." A "circumstantial" Hominem attack attempts to refute a claim by showing that the proponent has been inconsistent in his support of the claim.

The ad Hitlerum Fallacy is an instance of ad Hominem. Ad Hitlerum occurs when an opponent is likened to Hitler or the Nazis as a way of discrediting his argument. Discrediting an argument because the proponent is of a certain race, religion, or gender, is ad Hominem.

An ad Hominem attack is legitimate when the attack targets something relevant to the merits of the argument.

14. Argumentum Ad Hominem Tu Quoque. An "ad hominem tu quoque" attack is one that criticizes an opponent for having previously said something inconsistent, or having previously acted in a manner inconsistent with his or her current position in a dispute. The fact that the proponent previously espoused a different view doesn't establish that the position being currently advocated is incorrect. Acting inconsistently may show the proponent is a hypocrite, but it doesn't disprove the argument itself.[345] Additionally, changing one's position, when an earlier position is no longer convincing, is a sign of good reasoning, not bad.

15. Argument From Fallacy (ad Logicano). The Fallacy of Argument From Fallacy is an argument that, because an opponent's argument is fallacious, it therefore follows that his/her conclusion is false. A fallacious argument does not prove that its conclusion is true, but the fact it is fallacious does not establish that the conclusion is false. You must distinguish failure to prove from disproof.

16. Argument from Ignorance (ad Ignorantiam). Argument from Ignorance is the contention that a proposition is false because it has not been proved, or is true because it has not been disproved. Example: "P is unproved; therefore, not-P is true."[346] This is a shifting of the burden of proof. This kind of reasoning is not fallacious in instances, like a trial, where the law assigns a burden of persuasion to a party and the failure to meet that burden has the effect of negating the proposition. For example, in a criminal trial the defendant is either "guilty" or "not guilty." By law, the failure of the prosecution to prove guilt beyond a reasonable doubt results in the negative of the proposition being taken as true. Another example would be a belief that a medicine is safe because no clinical studies have demonstrated negative side-effects. If such belief is based on one study, the

conclusion is strongly fallacious. As more studies are conducted, the conclusion becomes less-and-less fallacious.[347] One psychological experiment reflects that examinees rated a conclusion based on one study to be weaker than a conclusion based on 50 studies.[348]

17. Argument From Popular Appeal (ad Populum). Arguing From Popular Appeal is claiming that someone should accept an argument because a large number of people approve the argument. The argument has the form: "Most people approve of X; therefore X is true".

18. Argument to Moderation (ad Temperantiam). Argument to Moderation, also called the Fallacy of the Middle Ground, or Fallacy of False Compromise, is accepting an argument because it lies between two competing positions. The Fallacy has the structure: Party A and Party B are arguing two positions, position A and position B. Position C falls between A and B. Therefore, C is the correct position.[349] The flaw is in thinking that the middle ground is always preferable. Sometimes the choice really does boil down to either of two positions (i.e., a woman is either pregnant or she is not).

19. Bandwagon Effect. The Bandwagon Effect, sometimes called "Peer Pressure," is an argument where the listener's discomfort at being left out of the group is used to persuade, rather than the merits of the argument.

20. Complex Question. The "Fallacy of the Complex Question" occurs when a question is predicated on an unstated assumption, so that any answer to the question tacitly affirms the assumption. This is sometimes called a "loaded question" or a "trick question." Example: "When did you stop beating your wife?" If you give any date in response, you confirm that at one time you beat your wife. To meet the trick question head on, you can identify the unstated assumption and disagree with it. Sometimes a person will ask a loaded question without realizing that the question contains a false premise. In that instance the fallacy can be pointed out in a friendly way. See Section XIV.M.

21. Converse Accident. "Converse Accident Fallacy" occurs when you form a general rule based on a few cases that are not representative of the norm. It is a form of Hasty Generalization.

22. Equivocation. "Equivocation" occurs when someone uses the same term in different senses in an argument. When it occurs with the Middle Term of a Syllogism, it causes the Fallacy of Four Terms. See Section VII.B.10.a. In George Orwell's ANIMAL FARM, once the pigs established ascendancy over the other farm animals, they avoided having to rescind the animals' motto by adding a second part, which used Equivocation: "All animals are equal. Some animals are more equal than other animals." A subtle form of Equivocation can result from "Semantic Shift," which involves slowly changing the context in which the same words are repeated so as to achieve Equivocation by treating distinct meanings of the word as equivalent.

23. False Cause. The Fallacy of False Cause occurs when a cause is wrongly identified.

24. False Dilemma. Also known as "False Dichotomy," the Fallacy of False Dilemma occurs when a proposition requires you to choose between the specified choices, and in reality both choices are false or there are other choices available. The dichotomy has the structure: "Either A is true or B is true; B is false; therefore, A is true". The dichotomy is false when both A and B are false, and also when the choices presented are not collectively exhaustive. False Dilemma can be expressed by the proposition "You are either with us, or against us." This was both Hillary

Clinton's[350] and George W. Bush's[351] reaction to the September 11, 2001 attacks on the World Trade Towers and the Pentagon. Although the logic may be fallacious, the economic and military might of the United States forced such a choice on Pakistan.

25. Genetic Fallacy. The Genetic Fallacy occurs when the support of, or opposition to, a claim is based on the source of the claim, rather than the merits of the claim. An example would be supporting an argument by showing that it originated with a popular person, or a respected institution, etc., or discrediting an argument based on an unpopular source.[352]

26. Guilt by Association. The fallacy of Guilt by Association is an ad Hominem attack that a claim should be rejected because it is endorsed by unsavory characters. The form is: "People you don't like accept claim A; therefore you should reject claim A."

27. Irrelevant Conclusion (Ignoratio Elenchi). The Fallacy of Irrelevant Conclusion occurs where a proponent of one conclusion offers an argument that supports a different conclusion.

28. Misapplied Burden of Proof. The Fallacy of a Misapplied Burden of Proof occurs when a contesting party is required to prove a contention when the proposing party should have the burden of proof.[353] How a burden of proof is assigned, outside of litigation, can be tricky. Usually the person who wishes to change the status quo has the burden of proof because, as a practical matter, if people are not persuaded to change they will continue to do things in the same way.

29. Misleading Vividness. The Fallacy of Misleading Vividness occurs when a single or small number of dramatic examples are given greater weight that a significant amount of contrary evidence.[354]

30. Moving the Goalposts. Moving the Goalposts occurs when the standard for acceptance is moved to fit an argument, either to make it acceptable or make is unacceptable.

31. No True Scotsman Fallacy. The No True Scotsman Fallacy occurs when a person makes an ad hoc adjustment to a proposition in order to keep from admitting that it is Invalid. The Fallacy was presented by British philosopher Antony Flew:

> Imagine Hamish McDonald, a Scotsman, sitting down with his Glasgow Morning Herald and seeing an article about how the "Brighton Sex Maniac Strikes Again." Hamish is shocked and declares that "No Scotsman would do such a thing." The next day he sits down to read his Glasgow Morning Herald again and this time finds an article about an Aberdeen man whose brutal actions make the Brighton sex maniac seem almost gentlemanly. This fact shows that Hamish was wrong in his opinion but is he going to admit this? Not likely. This time he says, "No true Scotsman would do such a thing."[355]

32. Poisoning the Well. The Fallacy of Poisoning the Well occurs when someone attempts to defeat an argument by discrediting its proponent in advance of the proponent presenting his/her argument.

33. Questionable Cause. The Fallacy of Questionable Cause occurs when a causal connection is asserted between A and B without sufficient justification.[356] The Post Hoc Ergo Propter Hoc Fallacy is a specific instance of Questionable Cause, in that the Post Hoc Fallacy concludes that, because event A preceded event B, therefore event A caused event B.[357]

34. Special Pleading. The Fallacy of Special Pleading occurs when a proponent of an argument proposes the adoption of laws or

rules while exempting himself/herself from them without sufficient cause. For example, the United States Congress will sometimes exempt itself from laws it enacts that everyone else is required to obey.

35. Red Herring. A Red Herring is an irrelevant point introduced into a debate in order to divert attention from the merits being debated. The term derives from the fact that a fish, typically a herring, that has been cured in brine and heavily smoked, is reddish colored and has a pungent odor, reputedly strong enough to throw a sniffing bloodhound off the trail of its game. Red Herrings are especially effective when they trigger emotional reactions. An inappropriate analogy can be a Red Herring under the guise of an acceptable argument.

36. Relativist Fallacy. The Relativist Fallacy arises when an opponent argues that a proposition may apply to others but not to him or her, because s/he is unique. This could include the extreme position that all validity is relative. This Fallacy side-steps the validity of propositions that do apply universally (the relativist would say there are none).

37. Straw Man. The Straw Man Fallacy occurs when an advocate ignores his opponent's actual position and substitutes a weaker one that the advocate can more easily refute. Because the argument refuted is not the genuine argument, the Straw Man attack does not disprove the opponent's real argument. A straw man attack can be effectuated by quoting an opponent's words out of context, or by choosing to respond to an adversary who has presented a weak argument for the proposition, or by attacking an over simplified version of the argument, or by attacking a fictitious adversary.

XVI. CATEGORIZING FALLACIES. Fallacies have been described as "reasoning that is not cogent, which means reasoning that either (1) does not provide sufficiently good grounds for its conclusion; (2) employs unwarranted premises; or (3) ignores or overlooks relevant information."[358] Throughout this Article, Fallacies have been divided into two categories: logical fallacies and rhetorical fallacies, with logical fallacies being further subdivided into deductive fallacies and inductive fallacies. Over the millennia, Fallacies have been categorized in many different ways. Aristotle categorized Fallacies in 300 BC. Roman writers refined these categories and added more. These Fallacies were elaborated and multiplied (and given Latin names) during the Middle Ages. In 1620, Francis Bacon identified four Fallacies. In 1843, John Stuart Mill identified five categories of Fallacies. More recently, researchers using Bayesian conditional logic have evaluated the traditional Fallacies like arguments from Ignorance, Circular Arguments, Slippery Slope arguments, ad Populum, ad Hominem, and the like.

Some writers distinguish formal from informal Fallacies. Formal Fallacies are errors in the logical form of the argument, while informal Fallacies are errors of reasoning that cannot easily be expressed in our system of formal logic, but are nonetheless criticized as being wrong.[359] Other writers distinguish deductive from inductive fallacies. In this Article, logical fallacies are differentiated from rhetorical fallacies.

Here are some alternative divisions of fallacies into different categories.

A. ARISTOTLE'S FALLACIES. In his book *Sophistici Elenchi* (Sophistical Refutations), Aristotle listed thirteen "sophistical arguments" (fallacies), and divided them into two groups: "material fallacies" and "verbal fallacies." Material Fallacies included: Accident, Ignorance of Refutation, Affirming the Consequent, Begging the Question, Converse Accident,

Complex Question, Irrelevant Conclusion, Missing the Point, and False Cause. Verbal Fallacies included: Accent, Amphiboly, Equivocation, Composition and Division, and Figure of Speech.[360]

B. FRANCIS BACON'S FALLACIES. Francis Bacon perceived that the human mind had certain predispositions that could cause distortions in perceptions of the world. Bacon associated these predispositions with Fallacies, but he didn't call them fallacies. In his 1620 book NOVUM ORGANUM, Bacon called them "idols," and he had four of them: Idols of the Tribe, Idols of the Den, Idols of the Market, and Idols of the Theater.

> Aphorism 41: The idols of the tribe are inherent in human nature, and the very tribe or race of man. For man's sense is falsely asserted to be the standard of things. On the contrary, all the perceptions, both of the senses and the mind, bear reference to man, and not to the universe, and the human mind resembles those uneven mirrors, which impart their own properties to different objects, from which rays are emitted, and distort and disfigure them.
>
> Aphorism 42: The idols of the den are those of each individual. For everybody (in addition to the errors common to the race of man) has his own individual den or cavern, which intercepts and corrupts the light of nature; either from his own peculiar and singular disposition, or from his education and intercourse with others, or from his reading . . . .
>
> Aphorism 43: There are also idols formed by the reciprocal intercourse and society of man with man, which we call idols of the market, from the commerce and association of men with each other. For men converse by means of language; but words are formed at the will of the generality; and there arises from a bad and unapt formation of words a wonderful obstruction to the mind. . . .
>
> Aphorism 44: Lastly, there are idols which have crept into men's minds from the various dogmas of peculiar systems of philosophy, and also from the perverted rules of demonstration, and these we denominate idols of the theatre. For we regard all the systems of philosophy hitherto received or imagined, as so many plays brought out and performed, creating fictitious and theatrical worlds. . . .

In Aphorism 40, Bacon wrote that these idols could be avoided by forming notions and axioms on the foundation of true induction.

C. JOHN STUART MILL'S FALLACIES. John Stuart Mill wrote that "Logic is not concerned with the false opinions which 'people' happen to entertain, but with the manner in which they come to entertain them."[361] In his book ON FALLACIES, Mill states five categories of Fallacies: (i) Fallacies *à priori* (or Fallacies of Inspection), (ii) Fallacies of Observation, (iii) Fallacies of Generalization, (iv) Fallacies of Ratiocination, and (v) Fallacies of Confusion. Fallacies *à priori* occur with no actual inference taking place, where a person mistakenly assumes that his/her subjective awareness is a reflection of objective reality.[362] Fallacies of Observation result from error in sufficiently ascertaining the facts on which a theory is grounded.[363] Fallacies of Generalization include unverifiable generalizations, attempts to resolve into one things that are radically different, mistaking empirical for causal laws, Post Hoc Fallacy, and the Fallacy of False Analogies.[364] Fallacies of Ratiocination are arguments that rely on false Premises and those with true Premises that do not support the Conclusion. These include the failure to distinguish the contrary from the contradictory, syllogistic Fallacies, and the Fallacy of Changing the Premises.[365] Fallacies

of Confusion have their source in language, whether vagueness or ambiguity, or casual associations with words, and they are misconceiving the import of the Premises, forgetting what the Premises are, and mistaking the Conclusion that is proved.[366] Mill points out, however, that the distinctions between these categories of Fallacies fail upon close inspection.

D. A MODERN TAXONOMY OF FALLACIES. In THEORY AND PROBLEMS OF LOGIC (2d ed.), by Nolt, Rohatyn, and Varzl,[367] the authors divide fallacies into six categories: Fallacies of Relevance, Circular Reasoning, Semantic Fallacies, Inductive Fallacies, Formal Fallacies, and Fallacies of False Premises. Their Fallacies of Relevance occur when the Premises of an Argument have no bearing on the Conclusion, including Arguments that have a distractive element that diverts attention away from the lack of relevance. This category includes: ad Hominem abusive attacks, Guilt by Association, Tu Quoque attacks, Vested Interest arguments, Circumstantial ad Hominem attacks, Straw Man arguments, Appeals to Force, Appeals to Authority, Appeals to Pity, Appeals to Ignorance, Missing the Point, and Red Herring. Fallacies of Circular Reasoning involve assuming what you are trying to prove. Semantic Fallacies occur when the language used in an argument is ambiguous or so vague that it interferes with the ability to assess the cogency of the argument. Their Semantic Fallacies include ambiguity, amphiboly, vagueness, and accent. Inductive Fallacies occur when the probability of the Argument's Conclusion, given the Premises, is too low. Formal Fallacies occur when a valid rule of inference is misapplied or the rule followed is not Valid. Their final category is Arguments with False Premises, including False Dichotomy and Slippery Slope.[368]

XVII. MODERN ARGUMENT THEORIES.

A. THE TOULMIN MODEL OF ARGUMENT. Informal Logic is a loosely-integrated variety of approaches to reasoning and argumentation. An important theorist in the field was British philosopher Stephen E. Toulmin (died in 2009), later a professor at USC, whose 1958 book THE USES OF ARGUMENT is considered a seminal work in the field of Informal Logic. In the book, Toulmin suggested the Toulmin Model of Argument. Many found Toulmin's model to be an easier way to teach argumentation than either traditional Logic or traditional Rhetoric. Toulmin's Model has three main components: the Claim, the Support, and the Warrant; and three additional components: Quantifiers, Rebuttals, and Backing.

1. Claims. A Claim is a proposition or thesis that an arguer is trying to make. To make a good argument, the Claim should be stated in strong and unequivocal terms. However, Claims stated in terms of absolutes (all, none, always, never) are vulnerable to refutation by a single counter-example. To avoid this, Claims can be stated with Qualifiers that soften the statement somewhat. Qualifiers that soften the Claim include few, some, most, seldom, sometimes, often, usually, nearly always.

In legal arguments, the Claim is usually the reason the client should win. It is wise to limit a legal Claim to the narrowest scope that will assure a victory, in order to narrow the range of counter-arguments that can be used in refutation.

The Claim should be tailored to the supporting evidence.

Toulmin recognized three types of claims: fact (verifiable conditions in the real world), judgment/value (opinions, attitudes,

subjective assessments), and policy (future course of action).

2. Data. Data are the supports, grounds, evidence, or information that back up the Claim. Data can include assertions based on the arguers personal authority, quotations from famous people or respected writings, statements by experts, test results, statistics, physical evidence, statements of eyewitnesses, and the like. Data can also include appeals to human desires, needs, or values.

3. Warrants and Backing. Warrants are the assumptions, or principles, or logical statements, that link the Claims to the support. A Warrant could be a deductive conclusion, an inductive inference, an analogical comparison, an Enthymeme, or it could be a Rhetorical thing, like Ethos, Pathos, Logos. Backing is statements that support the Warrants, as opposed to supporting the Claims. Backing can show that the Warrant is supported by Logic or by observations of the real world.[369]

4. Rebuttals. Even carefully constructed arguments can be subjected to rebuttal arguments. Rebuttal arguments have their own structure of Claim, Data, Warrant, and Backing.

5. Comparison to Syllogism. Toulmin's Model of Argument, expressed in the form of a Syllogism, would have the following correlations: The Warrant would be the Major Premise; the Evidence would be the Minor Premise; and the Claim would be the Conclusion.

B. DEFEASIBLE REASONING. In recent years there has been strong interest in what are called "Defeasible Arguments." A Defeasible Argument is an argument offered to support a Conclusion with recognition that the Argument is subject to being invalidated by subsequent information or contrary Arguments that may later arise.[370] In contrast to an Argument founded on Deductive Logic--where the Argument is presented as being conclusive--it is understood with a Defeasible Argument that the Argument is provisional only, more like a hypothesis, to be used until something stronger or better comes along.

Defeasible Reasoning was suggested by legal philosopher H.L.A. Hart in 1948, was picked up by epistomologist (concerned with the nature of knowledge) philosopher Roderick M. Chisholm who applied it to perceptions about the world, and was later carried forward by American philosopher John L. Pollock, who developed a scheme of argumentation based on Defeasible Arguments. In Pollock's view, reasoning "proceeds by constructing arguments for conclusions."[371] Arguments are based on Premises. In Deductive Logic, the Conclusions we draw from the Premises are not defeasible (i.e., subject to being defeated). With Inductive Logic, however, as we learn more information we sometimes find that our original Premises remain true but the Conclusions we drew from these Premises are no longer supportable, and must be retracted or modified (see the black swan discussion in Section VII.B.1). Thus, in Inductive Logic our Conclusions are always defeasible, and subject to being disproved by what Pollock termed "defeaters," either "rebutting defeaters" or "undercutting defeaters."[372]

C. ARGUMENTATION SCHEMES. Modern writings on argument theory are tending away from argument patterns based on formal Logic and toward "argumentation schemes" or semi-formal argument patterns that loosely copy the premise-and-conclusion pattern or Modus Ponens structure of Formal Logic, but without the requirement of true Premises and certain Conclusions.[373] These argumentation schemes are believed to better approximate everyday conversation and the type of reasoning that occurs in law and

medical diagnosis.[374] One theorist, Douglas Walton, has offered an extensive list of argumentation schemes, including argument from sign, argument from example, argument from commitment, argument from position to know, argument from expert opinion, argument from analogy, argument from precedent, argument from gradualism, and slippery slope arguments.[375] These argumentation schemes are presumptive, meaning that they are defeasible. They are thus different from the "context-free kinds of deductive and inductive arguments so long studied in logic."[376] In Walton's conception, each argument scheme is matched with a series of "critical questions" that are used to test the validity and strength of the argument. Taking an example from one of Walton's articles, here is the argument scheme for "argument from expert," including its logical structure and related critical questions:

> *Major Premise*: Source E is an expert in subject domain S containing proposition A.
> *Minor Premise*: E asserts that proposition A (in domain S) is true (false).
> *Conclusion*: A may plausibly be taken to be true (false).

Here are the "critical questions" that match this argumentation scheme:

> 1. *Expertise Question*: How credible is E as an expert source?
> 2. *Field Question*: Is E an expert in the field that A is in?
> 3. *Opinion Question*: What did E assert that implies A?
> 4. *Trustworthiness Question*: Is E personally reliable as a source?
> 5. *Consistency Question*: Is A consistent with what other experts assert?
> 6. *Backup Evidence Question*: Is E's assertion based on evidence?[377]

This modern approach to argumentation schemes does not turn its back on 2,300 years of Logic and Rhetoric. It draws justifications from Aristotle's ideas of Enthymemes and Topics, only interpreted in a nontraditional way. Modern argument theory is an effort to take the principles suggested by Formal Logic and Formal Rhetoric and adapt them to the way argumentation actually occurs in modern life.

XVIII. DEGREES OF CERTAINTY. Legal propositions or arguments can have different degrees of certainty, usually discussed in terms of probability. In law, recognized degrees of certainty are usually discussed as degrees of proof: legally insufficient; colorable;[378] prima facie; factually sufficient; preponderance; clear and convincing; beyond a reasonable doubt; and conclusive.

XIX. CATEGORIES VS. GRADATIONS.

A. PHILOSOPHICAL PERSPECTIVE. As the Sorites Paradox (Section VII.L.1) indicates, categorical distinctions can be hard to apply and hard to justify near the borderlines of the categorical boundaries. The problem exists for any taxanomic classification scheme. The American Psychiatric Association's DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS (4th ed.) addressed this issue as it applies to diagnosing mental illness:

> This naming of categories is the traditional method of organizing and transmitting information in everyday life and has been the fundamental approach used in all systems of medical diagnosis. A categorical approach to classification works best when all members of a diagnostic class are homogeneous, when there are clear boundaries between classes, and when the different classes are mutually exclusive.[379]

Categories work when (i) the things inside each category are homogenious, (ii) the boundaries of the categories are clear, and (iii) the categories are mutually exclusive. If any of the three elements are missing, categories do not work well.

As an alternative to categories, people use dimensional approaches to differentiation. This is true in incremental measurements, such as height, length, weight, etc. However, things that cannot be counted cannot be dealt with easily using a dimensional standard, and therein lies the difficulty since so many important things in life cannot be quantified. As Einstein is reported to have said: ". . . . not everything that counts can be counted."[380]

B. LOGICAL PERSPECTIVE. Classical Deductive Logic has no problems with gradations because Logic is "bivalent," meaning that a Term, Proposition, or Argument is either totally true or totally false, and any other possibility lies outside of Deductive Logic. Probabilistic approaches to Logic recognize the limitations of bivalence, and address it by assigning different degrees of likelihood to Premises and Conclusions. Inductive Logic addresses gradations by determining the probability that something fits in a particular category. Analogical reasoning absorbs gradations into the process of making individual comparisons between objects.

C. LEGAL PERSPECTIVE. The law has faced and accommodated gradations in different ways.

Example: The late Professor Keith Morrison, of the University of Texas School of Law, used to tell his students: "Any fool knows the difference between midnight and noon. But few know when night ends and day begins." Professor Morrison, who taught federal income taxation, was also known to say: "There is a fine line between tax avoidance and tax evasion and a high price is paid for the ability to discern it." Few would expect to encounter such philosophical or even poetic insights in the study of federal income tax law. This goes to show that some lawyers are poets. But these examples also highlight the problems, and the opportunities, of gradations of the law.

Here are some gradations in the law, to name a few out of many:
When does a driver have to turn on his lights, under Texas law?
What is the minimum amount of cocaine necessary to constitute possession?
When is a defendant too crazy to be put on trial?
When is a published piece too humorous to be defamatory?
When is a convicted murderer too unintelligent to execute?
When is a fetus too alive to abort?
When are words or images of sexual behavior too artistic to be prosecuted?
When does free speech become treason?
When can a child be prosecuted as an adult?
When does an activity impact interstate commerce?
What constitutes "reasonable force" in protecting property?
When is information sufficient to constitute probable cause for a search?
When is a casual connection too remote to support liability?

Unlike philosophy, the legal process cannot afford to get lost in the blank spaces between words, since the law must arrive at a result. So even at the edge of the meaning of a word, or the limit of a concept, where distinctions are blurred, the law must make the choices that have to be made in order to reach a result.

XX. VAGUENESS. Vagueness is the bane of communicating with words or symbols. Vagueness is the center of one of the most contentious multi-disciplinary controversies of the last fifty years–whether words

themselves have meanings, or whether words have only the meanings that people attribute to them. The debate is too far advanced to enter into here, but there is much to gain from identifying the fundamentals.

Vagueness is a form of indeterminacy of meaning. The problem can be at the word level, where the word chosen is more general than what is needed of the word. Example: "Please identify State's Exhibit 23." "A firearm." "What kind of firearm?" "A pistol." "What kind of pistol?' "A Colt 45 caliber revolver." Whose Colt 45 caliber revolver?" "Mine." Another example: "Obligee shall make timely payment of all sums due under this contract." Q. How long after the due date does Obligee have to make payment? A. A reasonable time. Q. What is a "reasonable" time? A. I don't know.

Even a precise word or term can have a vagueness of meaning. Take the legal term "Due Process of Law." We can divide the term into *procedural* due process and *substantive* due process, but those terms are still too imprecise to have a definitive meaning. We can define due process of law using other words, but those words have meanings that in turn are imprecise. When the term "due process of law" is used in a particular case, it is most often conclusory. A defendant either was or was not afforded due process of law. That particular case becomes an example of due process, or an example of a denial of due process. But examples are vague themselves, because the facts of one case always differ from the facts of the next case. So examples help with vagueness but they can't eliminate it. This calls to mind Justice Potter Stewart's famous comment about how to define pornography: "I know it when I see it." That is an honest appraisal of the problem, but it is unsatisfactory as a legal standard that would permit people to know where the line is drawn as a guide to their activities.

Another challenging problem with vagueness involves a classification scheme that is applied to something continuous in nature. As you approach the dividing line between categories, the justification for putting something on one side of the dividing line and not the other begins to look arbitrary, and the items are hard to distinguish. This is the problem of "borderlines." It is reflected in the Sorites Paradox.[381] See Section VII.L.1.

XXI. DISAMBIGUATION. Disambiguation is a process of clarifying the meaning of a word or concept by stating what is not meant. This can be done using definitions that both include and exclude. It can be done by using parentheticals and footnotes, and other clarifying asides. It can be done by restating points in different ways. At a higher level, disambiguation means striving for clarity of meaning in what you write and say. In order to write and speak clearly, you must first think clearly. Thinking clearly requires practice and effort.

XXII. HEURISTICS AND COGNITIVE BIASES. Psychologists have noticed that people have approaches to thinking that both help and hurt an accurate assessment of a situation.[382]

A. HEURISTICS. "Heuristics" are simple rules that describe how judgments are made. Cognitive heuristics include: the representativeness heuristic, the availability heuristic, the primacy effect, the anchoring-and-adjustment heuristic, and the past-behavior heuristic.

The "representativeness heuristic" occurs when a judgment is made by deciding if an object or person is representative of a known category.

The "availability heuristic" occurs when judgments are influenced by the ease with which objects and events can be remembered.

The "primacy effect" exists when a person makes judgments quickly, sometimes without collecting sufficient data.

The "anchoring-and-adjustment heuristic" occurs when judgments vary depending upon the order of presentation of information in the diagnostic assessment process. For example, if the evaluator's judgment changes depending upon whether a piece of information is obtained early or late in the process, then the anchoring-and-adjustment heuristic applies.

The "past-behavior heuristic" occurs when predictions of future behavior are based on a person's past behavior.

The "recency effect" is the observed phenomenon that people asked to remember a list of items remember better the items that are last on the list. This has been generalized to a proposition that in a narrative, or in a trial, people remember what they heard recently better than what they heard prior to that.

B. COGNITIVE BIASES. A cognitive bias is a distortion in the way we see the world. There is a long list of recognized cognitive biases. Some of these are reflected in the lists of Fallacies discussed earlier in this Article. A partial list of recognized cognitive biases includes the following.

Mis-Estimation of Covariance--Mis-estimation of covariance occurs when someone analyzing a situation does not correctly describe the relationship between two events. Studies suggest that, in attempting to see if a correlation exists between an indicator and a result, people tend to assess covariance based on the portion of the sample that has the indicator while ignoring instances that do not have the indicator. In reality, knowing the correlation in both groups is necessary to make an accurate assessment.

Preconceived notions or expectancies–Psychological research suggests that preconceived notions affect not only a person's perception of the correlation between factors but that preconceived notions also impede the accurate processing of both new and remembered data.

Lack of Awareness–Studies of the problem suggest that person have negligible awareness of the factors that influence their judgment. This keeps them from implementing safeguards against influences that might color their judgment.

Overconfidence–Some psychologists argue that a person's overconfidence in his or her abilities impedes the improvement of their process of arriving at judgments. Thus, it is commonly accepted that more information improves a judgment, when studies have shown that too much information can degrade the ability to make a good judgment. This argument has been raised as an argument against expanding the information used to interpret a statute from the literal language of the statute to include legislative history.

Confirmation Bias–Research suggests that persons often form tentative conclusions in a short period of time, and that once those tentative conclusions are formed they can influence what additional information is sought, and how additional information is processed. The danger is that the person will unconsciously tend to want to confirm their preliminary hypothesis, rather than keeping an open mind until the data has been fully acquired and analyzed. So, Confirmation Bias is the tendency to selectively seek and consider evidence that confirms the hypothesis currently under consideration and not contrary evidence.[383]

Hindsight Bias--"Hindsight bias" occurs when knowledge of the outcome of an event alters a person's memory of what s/he expected

before the event.[384] It results from the tendency of people to want to believe that they were accurate in their predictions or expectations.

Halo effect--A long-standing view holds that there is a halo effect for physical attractiveness–where an attractive person will be judged more positively than a less attractive person. It is hard not to notice that cable news programs are currently dominated by young, attractive journalists, not so much old or overweight ones. And yet buxom female commentators are not prevalent on the news shows, suggesting that the producers may think that sexuality may detract from the credibility that they would like to project.

XXIII. USING LOGIC AND RHETORIC TO CONSTRUCT AND EVALUATE LEGAL ARGUMENTS. The principles of Deductive and Inductive and Analogical Logic examined in this Article can be used in constructing legal arguments. Some thoughts on applying these principles to legal arguments are set out in this Section. Likewise, the principles of Rhetoric can be used in constructing and delivering legal arguments. The Canons of Rhetoric have been discussed in Section XIV.D. and will not be repeated here, for as Lincoln noted, even great skill at speaking does not relieve a lawyer from "the drudgery of the law."[385] Recall that, in Rhetoric, "Commonplaces" are beliefs or values that the speaker or writer thinks are held by the audience. This Section of the Article examples legal Commonplaces that can be used to construct legal arguments.

A. ADAPTING LOGIC CONCEPTS TO LEGAL ARGUMENTS. Logical reasoning is a process that can be applied to legal argumentation. Abraham Lincoln wrote this about Deductive Logic:

> In the course of my law reading I constantly came upon the word demonstrate. I thought, at first, that I understood its meaning, but soon became satisfied that I did not. I said to myself, What do I do when I demonstrate more than when I reason or prove? How does demonstration differ from any other proof? I consulted Webster's Dictionary. They told of certain proof, proof beyond the possibility of doubt; but I could form no idea of what sort of proof that was. I thought a great many things were proved beyond the possibility of doubt, without recourse to any such extraordinary process of reasoning as I understood demonstration to be. I consulted all the dictionaries and books of reference I could find, but with no better results. You might as well have defined blue to a blind man. At last I said, Lincoln, you never can make a lawyer if you do not understand what demonstrate means; and I left my situation in Springfield, went home to my father's house, and stayed there till I could give any proposition in the six books of Euclid at sight. I then found out what demonstrate means, and went back to my law studies.[386]

1. Use Syllogisms. Syllogistic reasoning has been considered to be the core of deductive reasoning for over 2,000 years. Syllogistic reasoning can be used to construct or deconstruct a legal argument to see if it follows the rules of Deductive Logic, expressed through the Rules of Syllogisms and syllogistic Fallacies. Example: In a particular case, the defendant supplemented his list of persons with knowledge of relevant facts 29 days before trial. Tex. R. Civ. P. 163.5(b) says that an amended or supplemental discovery response made less than 30 days prior to trial is presumed not to have been amended reasonably promptly after the party discovers the necessity for such a response. Stated as a Syllogism, the issue would be: "Discovery supplementation made less than 30 days before trial is presumptively untimely. Tex. R. Civ. P. 163.5(b). The defendant supplemented its discovery

response 29 days before trial. Therefore, the supplementation is presumptively untimely and should not be allowed."

Another way to introduce a Syllogism into a legal argument is to use a simile and construct a Syllogism that is analytically similar to the proposition in question. Some psychological studies reflect that a strong disposition among persons to assess the validity of a Syllogism based on the believability of its content–called "Belief Bias."[387] To leverage Belief Bias in your favor, analogize the legal proposition in question to a Syllogism with content that is easily recognized as Valid (or Invalid, depending on the point you wish to make).

2. Use Enthymemes. Aristotle drew his insights on Logic from observing argumentation, and he used examples from argumentation to illustrate many of his points. Aristotle noticed that Greek speakers did not speak in Syllogisms–they spoke in Enthymemes, or truncated Syllogisms. A typical Enthymeme is a Conclusion supported by the Major Premise, leaving the Minor Premise unmentioned. In constructing your argument, and considering how to formulate an Enthymeme, you may find that it is better to state the Minor Premise explicitly, or you may not. It is a choice you can make consciously, once you are aware of the choice. You may find that it is better to emphasize the Middle Term of a Syllogism, or better to understate it. These are conscious choices, once you know the structure of syllogistic reasoning.

Here is the example given in the previous section, stated as an Enthememe: "Because the defendant supplemented discovery within 30 days of trial, the supplementation was untimely and should be stricken. Tex. R. Civ. P. 163.5(b)." In this Enthememe, the Major Premise is left unstated: "Discovery supplementation made less than 30 days before trial is presumptively untimely."

3. Use Conditional Propositions (Implication). Conditional Propositions are Implications, which have the form "P implies Q" or "if P then Q". Many legal issues can be expressed at Conditional Propositions. The example used in the two foregoing sections can be stated as a Conditional Proposition: "If a party supplements discovery within 30 days of trial, then the supplementation is untimely and should be stricken. Tex. R. Civ. P. 163.5(b). The defendant supplemented discovery 29 days before trial. Therefore, the discovery supplementation should be stricken."

Another example: Confidential communications between a client and his/her lawyer are privileged. Tex. R. Evid. 503(5). The problem may be stated: "If the email from Jones to his lawyer fits the definitions in Tex. R. Evid. 503, then it is privileged." Proceed to confirm whether the email meets the definitions in the Rule.

Another example: An out-of-court statement is hearsay if it is offered into evidence to prove the truth of the matter asserted. Tex. R. Evid. 801(d). Unless an exception applies, hearsay evidence is inadmissible. Tex. R. Evid. 802. The problem can be stated: "If an out-of-court statement is offered for the truth of the matter asserted, then it is inadmissible. Tex. R. Evid. 802."

Another example: A successful plaintiff can recover attorney's fees if the claim is for: (1) rendered services; (2) performed labor; (3) furnished material; (4) freight or express overcharges; (5) lost or damaged freight or express; (6) killed or injured stock; (7) a sworn account; or (8) an oral or written contract. Tex. Civ. Prac. & Rem. Code § 38.001. The legal issue may be stated: "If the plaintiff's claim fits any category listed in Section 38.0001, then the award of attorney's fees must be upheld on appeal."

Another example: Driving while intoxicated is an offense under Tex. Penal Code § 49.04. A person is intoxicated if either (i) her/his alcohol content exceeds 0.08%, or (ii) s/he does not have normal use of mental or physical faculties by reason of taking alcohol or other drug. *Id.* § 49.01(1). If either (i) or (ii) apply (the Inclusive Disjunction), then an offense was committed. If the defendant had not drunk alcohol but had smoked marijuana, then (i) is ruled out and an offense was committed only if (ii) applied.

The common element of these examples is that a specific legal rule applies to the issue in question, and determining whether the facts of the case fall within the operation of the rule determines the outcome. This type of legal problem can be resolved using Deductive Logic.

4. Use Inductive Reasoning. Inductive Reasoning moves from particular instances to a general Conclusion. The more individual instances there are that support the Conclusion, the Stronger the Conclusion will be. Suppose that the issue on appeal is whether the trial court committed reversible error in denying the defendant a continuance due to the fact that its lead counsel was already in trial in another case, requiring the defendant to go forward with second-chair counsel who was an associate attorney with little trial experience. Citing one case that found reversible error on similar facts is some support. Finding three is more support. Finding ten would be strong support. If there are no Texas cases on point, then including out-of-state cases may raise the level of support to the winning point.

Any time a decision is addressed to the trial court's discretion, then the outcome is not dictated by legal rules, and Deductive Reasoning cannot be used. By finding cases involving the same exercise of discretion, and fact patterns that are similar to the case at hand, a general rule can be abstracted that, given a certain set of facts, prior judges have exercised their discretion in a certain way. Even if the appellate courts have nearly always affirmed the trial court's decision, perhaps some kind of precedent can be inductively developed based on the way the trial courts exercised their discretion in the individual cases.

5. Use Analogical Reasoning. Analogical Reasoning can be used when Deductive and Inductive Reasoning do not lead to a solution.

Example: "Boating while intoxicated" is an offense under Tex. Penal Code § 49.06. The offense involves "operating a watercraft." "Watercraft" is defined as a "vessel . . . or other device used for transporting or carrying a person on water, other than a device propelled only by the current of water." *Id.* § 49.01(4). The term "operating" is not defined in the Penal Code. On one Saturday afternoon, ten U.T. fraternity bothers were arrested on the Guadalupe River south of Austin. All were intoxicated. At the time of arrest: two were in a canoe, but only the boy in the stern had a paddle; two were in a rubber raft, which had a rudder but no paddles; one was in an innertube and had a paddle, but when he paddled he only turned in a circle; one was in an innertube that was tethered to the canoe; two were standing on a shallow dam tugging on the raft to drag it over the dam and back into the flow of the river. Who committed the offense of boating while intoxicated?

Example: under the case of *Kyllo v. U.S.*,[388] the U.S. Supreme Court held that the government must have probable cause in order to "search" a person's home using a "thermal imaging device," which would detect high intensity lights that are used to grow marijuana. The Transportation Safety Administration plans to install full-body scanners[389] at John F. Kennedy Airport in

September 2010, and to require persons passing through security to undergo the scans. Is probable cause required to conduct an electronic full body scan of a person seeking to board an airplane?

6. Use Fallacies. While Fallacies are improper reasoning, there are instances where the Premises and the Argument may not support a Conclusion 100% but may support them to a sufficient degree. In argumentation, where deductive certainty is not required, it is fine to use fallacious reasoning. Inductive Fallacies are usually a matter of degree, and can be used in argumentation to the extent they are considered persuasive. Rhetorical Fallacies might be wrong in some instances and right in others. Known Fallacies should therefore be considered Commonplaces for use in argumentation.

7. Indirect Argument. In Logic, an indirect argument assumes the negative of the Premise and shows that it leads to a logical contradiction. More loosely, in argumentation an indirect argument supports the proponent's Conclusion by showing that the opposing argument leads to illogical or undesirable consequences. Using the opponent's Premise to construct an argument that refutes the opposing argument--and confirms your own--is doubly successful. Abraham Lincoln did just this in his famous Cooper Union speech.

Lincoln's speech at Cooper Union in New York City on February 27, 1860, was an essential step in his proving to the Republicans of the Atlantic states that this ungainly prairie lawyer was a credible choice to be the Republican Party's nominee for President. But the speech is also an superb example of indirect argument. At the outset of the speech, Lincoln identified as his chief antagonist Stephen A. Douglas, the Democrat Senator from Illinois, who argued that the Federal government did not have the power to exclude slavery from the new states being created in the westward expansion of the white race. Lincoln held the opposite view. In opening his Cooper Union speech, Lincoln identified the following statement that had been offered by Douglas to support his view:

> "Our fathers, when they framed the Government under which we live, understood this question just as well, and even better, than we do now."[390]

Lincoln went on to say: "I fully indorse this, and I adopt it as a text for this discourse. I so adopt it because it furnishes a precise and an agreed starting point for a discussion between Republicans and that wing of the Democracy headed by Senator Douglas. It simply leaves the inquiry: 'What was the understanding those fathers had of the question mentioned?'" Having adopted Douglas's Premise, Lincoln proceeded to recount the instances in which individual signers of the United States Constitution had voted in favor of federal limitations on the expansion of slavery, or had publicly endorsed such a limitation. Lincoln established that a majority of the "fathers" had publicly supported such a limitation. By adopting Douglas's premise, and showing that it led to the opposite of the conclusion Douglas espoused, Lincoln both refuted Douglas's argument and proved his own.

B. USE OF AUTHORITIES TO SUPPORT A LEGAL ARGUMENT. In a debate against Stephen A. Douglas, Abraham Lincoln said:

> There are two ways of establishing a proposition. One is by trying to demonstrate it upon reason, and the other is, to show that great men in former times have thought so and so, and thus to pass it by the weight of pure authority.[391]

Lincoln captured an important aspect of legal argumentation–that is the use of authority as a substitute for logically demonstrating a

point. Many legal arguments take as their starting point some rule or principle that is authoritative and needs no justification (i.e., an Axiom). This is why advocates strive to come within or fall without the scope of a legal rule, and why lawyers and judges encounter difficulties with legal reasoning when a problem arises that does not clearly fall within the established scope of any rule. But there are other forms of authority besides the constitution, statutes, and past appellate opinions.

1. Invoking the Diety. Many a successful argument has been predicated on invoking the Diety. The Law of Moses--the Ten Commandments–is an unassailable premise for making a moral argument to certain groups. Likewise, for many people a biblical quotation of Jesus of Nazareth or Paul of Tarsus is a rock-solid foundation for a moral or even political argument. Many Christian preachers build entire sermons around an appeal to the Diety, particularly Protestant preachers who base their sermons on biblical passages that are accepted as Axioms for purposes of their arguments. Since they are preaching to believers, both the preacher and the audience assume the truth of the biblical passage as a starting point for the argument. If the Protestant preacher were to address an audience of atheists, or Buddhists, or Hindus, the audience would first require some validation of the Premise of biblical validity before they would be persuaded by the reasoning that follows from the Premise.

Appeals to the Diety appear in law, although less today than in the past. Blackstone made an appeal to the Diety to support his theory of natural law as the foundation for human law. See Section IV. Take Jefferson's statement in the Declaration of Independence that "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights . . . ." The terms "created" and "endowed by their Creator" are appeals to the Diety. In contrast, "We hold these truths to be self-evident" is a logic-based explanation why no proof is offered or needed to support the Conclusions that Jefferson is proposing.

2. Invoking a Higher Authority. Invoking a higher authority has been a defense in prosecutions of combatants for extraordinarily bad behavior in times of war. The defense of "Superior Orders" was successfully used in a post-World War I trial by a German submarine captain who sank a British hospital ship, acting on orders provided by a superior. The defense was specifically excluded by the London Charter of the International Military Tribunal, adopted to govern the trial proceedings of German military and political figures in Nuremburg in 1945, after Germany's unconditional surrender at the end of World War II.[392]

3. Invoking the Founding Fathers. On certain issues, particularly of constitutional law, advocates and judges will look for support in the writings of the leaders of the American Revolution, or proponents of the ratification of the U.S. Constitution. Peculiarly, not much attention is paid to James Madison's detailed notes of the debates and compromises on a day-by-day basis during the constitutional convention, which became available after his death on July 4, 1836.[393] Also, advocates and courts seldom cite the well-documented debates pro and con at the various colonies' ratification conventions. The pro-constitution writings of Madison, Hamilton, and Jay, published originally as letters to the editor and later as The Federalist Papers, seem to be given paramount consideration in such matters. Appellate opinions continue to quote the Founding Fathers on occasion.

a. Lincoln's Cooper Union Speech. Lincoln's 1860 Cooper Union speech was a triumph of legal research in determining the

Founding Fathers' views on the power of Congress to regulate slavery in new states. His conclusion: "The sum of the whole is, that of our thirty-nine fathers who framed the original Constitution, twenty-one--a clear majority of the whole-certainly understood that no proper division of local from federal authority, nor any part of the Constitution, forbade the Federal Government to control slavery in the federal territories...." Lincoln's argument was an appeal to the Founding Fathers coupled with an Appeal to the Majority.

b. Lincoln's Gettysburg Address. Abraham Lincoln began his Gettysburg Address "*Four score and seven years ago* our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated to the proposition that *all men are created equal."* [Emphasis added]. Lincoln conflated the Declaration of Independence with the U.S. Constitution. The Gettysburg Address was given in 1863, which was 87 years (four score and seven years) after the Declaration of Independence was signed. The "new nation," meaning the United States of America, actually started functioning in 1789, only 74 years before Lincoln's speech. It was the Declaration that confirmed the proposition that "all men are created equal." In contrast, the Constitution–without actually using the word--recognized the condition of slavery as part of the plan of government. For example, persons held in bondage were counted as 3/5 of a person for purposes of determining the number of Congressmen to be allocated to slave states. The Fugitive Slave clause required Free States to return escaped slaves to their owners. The right of states to import slaves was guaranteed through 1808, by Article I, Section 9 of the U.S. Constitution. Lincoln was not appealing to law in this famous quotation. He was appealing to the Founding Fathers.

4. Self-Evident Propositions (Axioms). An Axiom is a Premise that treated as true without proof of its truth. Jefferson's words in the Declaration of Independence presented a series of startling assertions as if they were too obvious to require proof. This included the assertion that all men are created equal, and that all men have the right to life, liberty, and the opportunity to pursue happiness. In appellate opinions, we sometimes encounter an Axiom when the court uses words like: "It is too well-established to need citation that . . . ." Any legal argument that takes a constitutional provision, statute, or court holding, as a given, is using that authority as an Axiom. John Stuart Mill observed that Axioms are necessary, because if each Premise required proof of its underlying Premises, every argument would require "an infinite series of proof, a chain suspended from nothing."[394]

5. Affirmation by the Majority. In the quasi-democratic society we live in, we are quite familiar with the process of resolving disputes by majority vote.[395] This is (approximately) the way we elect the President, this is the way bills become law, and it is the way most other elective offices are filled (excepting those few instances where the election is won by the largest plurality). Outside of politics, many times a group will not take action unless there is a consensus on such action is taken. In court cases, a super-majority is required to reach a jury verdict in a civil case and a unanimous vote is required to reach a verdict convicting someone of a crime. Regardless, legal decisions are often based on the views of the majority, whether that be the majority reflected by a vote, or by surveys, or by intuition. The argument will be phrased: "a majority of the states do so-an-so," or "a majority of the courts who have addressed the issue....."

The same process exists for determining who wins an appellate case that has been accepted for review. The winner is determined by

majority vote regarding the proper disposition of the appeal, without regard to the degree of concurrence on the reasons for each Justice's vote. Where an appellate court decides a case, and issues opinions, but no opinion garners the support of a majority of the members of the court, then the lead opinion is a plurality opinion, and it is not accorded precedental weight and does not constitute stare decisis. See Section XXIII.B.7.

6. The Hierarchy of Legal Authorities. Law is hierarchical, in the sense that rules and principles are ranked so that, if they collide, some rules or principles will prevail over other rules and principles. Hierarchical structure is reflect in Tex. R. Evid. 101(c),which provides the following hierarchy of governance in criminal proceedings:

> Hierarchical governance shall be in the following order: the Constitution of the United States, those federal statutes that control states under the supremacy clause, the Constitution of Texas, the Code of Criminal Procedure and the Penal Code, civil statutes, these rules, and the common law.

In general terms, of legal principles and rules in the United States, the pre-eminent source of legal authority to which all other laws are subordinate is the U.S. Constitution, but only in areas where the Constitution applies. Beneath the Constitution are federal statutes and treaties, then federal regulations, then federal court pronouncements (which carry the weight of the authority upon which they are based, whether that be the Constitution, federal statues, or federal case law). However, constitutions speak in broad terms about general principles, and leave much for the legislature and courts to determine.

Federal law in the United States is supreme only in areas where preemption of state law has occurred. Preemption is limited in some areas, such as the law governing many property rights, contracts, divorce, parent-child issues, and probate, to name a few. Federal law augments and overlaps with state criminal laws. Special considerations apply to the question of which parts of the Bill of Rights to the U.S. Constitution apply to the states. State law has a similar hierarchy, with the state constitution being superior to state statutes, which has priority over state court decisions (except when the court says that the statute conflicts with a law superior to the legislation). Federal court opinions interpreting state law have no precedential effect in state courts.

Inside the court system, supreme court cases prevail over decisions of intermediate courts of appeals. Trial court decisions have no weight, other than that they bind the parties to the law suit through the doctrines of claim preclusion and issue preclusion.

7. Stare Decisis. Stare decisis is the rule in Anglo-American law that prior decisions of a court of last resort are binding on subsequent decisions of courts who are faced with the same question between different parties. This rule of consistency can be simply stated, but it is more complicated in its application.

a. Prior Appellate Decisions. Like all courts in America, the courts in Texas recognize the doctrine of stare decisis, or the binding effect of decisions issued by appellate courts. The doctrine requires courts to follow the law previously declared and applied by a higher court. Thus trial courts are bound by intermediate appellate court decisions issued by the appellate court in whose district they reside, and by Supreme Court decisions (or in criminal cases the Texas Court of Criminal Appeals decisions). Intermediate appellate courts are bound only by Supreme Court or Court of Criminal Appeals decisions, although some intermediate courts consider themselves bound by earlier decisions issued by that

intermediate appellate court. However, stare decisis only operates when there is sufficient similarity between the facts of the earlier case and the current case. *Meyer v. Texas Nat. Bank of Commerce of Houston*, 424 S.W.2d 417, 420 n. 2 (Tex. 1968) ("The bindingness of a prior decision under the rule of state decisis cannot be determined apart from a consideration of the facts of the case, or perhaps stated more accurately, the facts which the deciding judges deemed important"). Prior cases whose legal principles or underlying facts are too different from the case at hand are said to be "distinguishable," meaning that they do not operate as precedent for the case at hand.

b. Holding, Dictum and Judicial Dictum. Considering appellate opinions themselves, stare decisis effect is accorded only the holding, together with statements in the court's opinion that are necessary to that holding, but not obiter dicta. The rationale announced by the appellate court in support of its decision has no precedential weight unless it is necessary to the holding and is supported by a majority of the justices sitting in the case. While this point is often lost, the Supreme Court said so in *Marmon v. Mustang Aviation, Inc.*, 430 S.W.2d 182, 193 n. 1 (Tex. 1968):

> The bindingness of a series of holdings of a court of last resort under the rule of stare decisis is determined by the 'decision' rather than the opinion or rationale advanced for the decision. 21 C.J.S. Courts §§ 181, 186, pp. 289, 297. The controlling principle of a case is generally determined by the judgment rendered therein in the light of the facts which the deciding authority deems important. Goodhart, 'Determining the Ratio Decidendi of a Case,' Jurisprudence in Action, p. 191.

You can glean precedent from plurality and concurring opinions by comparing the different opinions issued in the case to find views or propositions that are necessary to the holding and are shared by a majority of the members of the court. Dissenting opinions have no precedential weight at all. In Texas, unpublished appellate court opinions have no precedential value. Tex. R. App. P. 47.7. For a more detailed discussing precedential weight, see Richard R. Orsinger, *The Role of Precedent*, TEXAS SUPREME COURT MANUAL ch. 11 (State Bar of Texas 2005).

8. Appeals to History. Appeals to history are sometimes used to support legal arguments, particularly when interpreting the Constitution. Johnny Cochran, in his closing argument in the O.J. Simpson murder trial, read a quotation from former slave Frederick Douglass to the jury, written he said "shortly after the slaves were freed."[396] It is noteworthy who Cochran chose to quote, given the racially-charged atmosphere of that case and the fact that eight members of the jury were African-American.

9. Policy Arguments. Beginning early in the Twentieth Century, the U. S. Supreme Court began to discuss the policy implications of their decisions in cases as an important factor in reaching their decision. It is now commonplace, in difficult cases, to append policy arguments onto legal argument as a way of supporting a ruling or a dissent from a ruling. While policy is in a sense subordinate to the letter of a statute or the holding of a prior case, since many legal disputes become issues of interpreting statutory language or determining the ramifications of prior court rulings, policy can be an important part of a legal argument.

10. Appeals to Statistics. In some instances, the issues in a legal dispute fall in a domain where statistics are available to support arguments in the case. In *El Chico Corp. v. Poole*, 732 S.W.2d 306, 311 (Tex. 1987), Justice Franklin Spears wrote:

> In addressing foreseeability, we know by common knowledge that alcohol distorts perception, slows reaction, and impairs motor skills, while operation of an automobile requires clear perception, quick reaction, and adept motor skills. Our everyday use and reliance on the automobile is unquestionable. Also unquestionable is the tragic relationship between intoxicated drivers and fatal or injury-producing accidents. The most recent available statistics show that in 1985, there were 30,794 total motor vehicle traffic accidents in Texas involving intoxicated drivers. See TEX. DEP'T OF PUBLIC SAFETY, A LOOK AT DWI ... ACCIDENTS, VICTIMS, ARRESTS 1-4 (1985 ed.). In those accidents, 989 persons were killed and 25,461 were injured. The 1985 figures represent a 6% decrease over 1984, due in part to society's increased awareness of the danger of drunk driving and an increase in "driving while intoxicated" arrests. Id. The risk and likelihood of injury from serving alcohol to an intoxicated person whom the licensee knows will probably drive a car is as readily foreseen as injury resulting from setting loose a live rattlesnake in a shopping mall.

Reasoning from statistics is discussed above in connection with Inductive Reasoning. See Section XIII.C.4 & 5. Statistical Fallacies are discussed in Section VIII.F.9.

C. LEGAL "COMMONPLACES" TO USE IN LEGAL ARGUMENTS. There are many Commonplaces that can be used in legal arguments. Some important legal Commonplaces are discussed below.

1. Failure to Contest and Concession. When a disputant fails to contest a point, it may be taken as conceded, but that is not always the case. For example, under Tex. R. Civ. P. 239, the failure of a defendant to timely file an answer on appearance day allows the plaintiff to take a default judgment. However, under Rule 243, in a case with unliquidated damages, only liability is conceded by the failure to answer, not the amount of unliquidated damages. Under TRAP 38.8(a)(3), if the appellant fails to file a brief but the appellee does, the appellate court can rely on appellee's brief as correctly presenting the case and may rule without examining the appellate record. In *Strackbein v. Prewitt*, 671 S.W.2d 37, 39-40 (Tex. 1984), the Supreme Court held that the failure to contest affidavits, attached to a motion for new trial explaining why an answer was not timely filed before a default judgment, meant that there was no factual dispute and the movant need only make a prima facie showing of no conscious indifference.

Where a point is conceded by a disputant, it is taken as conclusively established and no longer needs to be proved. Appellate courts, particularly Supreme Courts, in oral argument will sometimes try to get the oral advocate to concede some point that will narrow the dispute or sometimes even undermine the advocate's position. In preparing for oral argument, it is important to evaluate the weaknesses in an argument and to decide, in advance, what to concede and when to concede it. In making concessions the lawyer must realize that his role is to advocate, not judge. However, refusing to make reasonable concessions can call the advocate's sincerity and credibility (Ethos) into question, thereby weakening other, more convincing arguments.

2. Acquiescence. Acquiescence is tacit or passive assent or agreement to something. There are instances where acquiescence comes to play in legal disputes. This occurs with adverse possession of land, accepting late performance of a legal obligation, and laches.

3. Waiver. "Waiver" has been defined as the intentional relinquishment of a known right.

Ulico Casualty Co. v. Allied Pilots Association, 262 S.W.3d 773 (Tex. 2008). However, there is a distinction between the purposeful waiver defined above, and inadvertent waiver that is by its nature unintentional. A person can inadvertently waive legal rights in a variety of ways. The inequity of a criminal defendant unknowingly waiving procedural safeguards was the driving force behind the Conclusion that the Sixth Amendment guaranteed a criminal defendant the right to appointed counsel, announced for federal prosecutions in *Johnson v. Zerbst*, 304 U.S. 458, 457 (1938) and extended to state prosecutions in *Gideon v. Wainwright*, 372 U.S. 335 (1963). Waiver is an ever-present concern for appellate lawyers, who may be unable to raise valid arguments on appeal because the right to raise the complaint was not preserved in the trial court. Tex. R. Evid. 103(a)(1) (error may not be predicated on evidentiary ruling without "timely objection . . . stating the specific ground of objection"); Tex. R. App. P. 33.1 ("[a]s a prerequisite to present a complaint for appellate review, the record must show" a timely and specific complaint that was overruled by the trial judge).

4. Action vs. Inaction. Most legal disputes involve an act that is illegal or is actionable. However, certain failures to act can be criminal or actionable, as well. The Texas Penal Code criminalizes certain types of "conduct," which includes an act or an omission, but an omission counts only when the person has a duty to act. Tex. Penal Code §§ 6.01(a), 1.07(10). In some instances a person can be held criminally responsible for actions he did not commit, or for failing to stop another from acting. See Tex. Penal Code § 7.02 (criminal responsibility for conduct of another). Houstonians in their sixties will remember the trial of Dr. John Hill, accused of murdering his wife Joan Robinson Hill by withholding medication. His jury hung, but he was later murdered (just desserts?).

5. Mental State. The mental state of a person can be an important determiner of the outcome of a legal dispute.

a. Culpability in Criminal Law. Under the Texas Penal Code, a person can be convicted only if he acts (or fails to act when legally obligated to do so) if he has one of four culpable mental states: intentional, knowing, reckless, or criminal negligence. Tex. Penal Code § 6.02(d). Intent requires a conscious objective or desire to engage in the conduct or cause the result. Tex. Penal Code § 6.03(a). Knowing requires an awareness that the conduct is reasonably certain to cause the result. *Id.* § 6.03(b). Reckless means awareness but conscious disregard of a substantial and unjustifiable risk that constitutes a gross deviation from the standard of care of an ordinary person under all the circumstances viewed from the actor's viewpoint. *Id.* § 6.03(c). Criminal negligence is the failure to perceive a substantial and unjustified risk that constitutes a gross deviation from the standard of care that an ordinary person would exercise under all the circumstances as viewed from the actor's standpoint. *Id.* § 6.03(d). If a person proves that he committed the offense under duress, meaning he was compelled to act "by threat of imminent death or serious bodily injury to himself or another," then he is not guilty of the offense. Tex. Penal Code § 8.05.

b. Culpability in Tort Law. The RESTATEMENT (SECOND) OF THE LAW OF TORTS (1965) distinguishes between tortious behavior that is intentional, negligent, and reckless. See Restatement § 500, Comment f (intent v. reckless) and Comment g (reckless vs. negligent). Intent is defined in § 8A ("the actor desires to cause consequences of his act, or that he believes that the consequences are substantially certain to result from it"). Reckless is defined in § 500 ("knowing or having reason to know of facts which would lead a reasonable man to realize, not only that

his conduct creates an unreasonable risk of physical harm to another, but also that such risk is substantially greater than that which is necessary to make his conduct negligent"). Negligence is defined in § 282 ("conduct which falls below the standard established by law for the protection of others against unreasonable risk of harm"). In *Louisiana-Pacific Corp. v. Andrade*, 19 S.W.3d 245, 246-47 (Tex. 1999), the Texas Supreme Court distinguished negligence and gross negligence in this manner: "what separates ordinary negligence from gross negligence is the defendant's state of mind; in other words, the plaintiff must show that the defendant knew about the peril, but his acts or omissions demonstrate that he did not care."

c. Mental Competency. Mental competency to testify is governed by Tex. R. Evid. 601. Everyone is competent to testify except for insane persons and children who do not possess sufficient intellect to relate the transactions in question. Mental incompetency for purposes of commitment into state custody requires proof that the person is suffering from a mental illness and that hospitalization is necessary for the protection of the person himself or for the protection of others.[397] Insanity can also affect whether the state can prosecute a person accused of a crime, and is sometimes a defense to prosecution. Tex. Penal Code § 8.01 ("at time of conduct charged, the actor, as a result of severe mental disease or defect, did not know that his conduct was wrong"). Texas law recognizes "temporary insanity caused by intoxication" as a factor in punishment, but not as a defense. The state cannot prosecute a person who was less than 15 years of age at the time of the crime, except for perjury, vehicular violations, misdemeanors subject to fine only, and certain felonies. Tex. Penal Code § 8.07. The death penalty cannot be assessed if the actor was under age 18 when the offense was committed. Texas Penal Code § 8.04. The U.S. Bill of Rights prohibits the execution of a person who is mentally retarded. *Atkins v. Virginia*, 536 U.S. 304, 311 (2002).

6. Subjective Vs. Objective Points-of-View. In law, a *subjective* point-of-view is the point-of-view of the individual under scrutiny at the relevant point-in-time. An *objective* point-of-view is the point-of-view of a reasonable person who is hypothetically placed in the same situation as the individual under scrutiny at the relevant point-in-time.

Evaluating a situation *subjectively* requires an inquiry into the actual awareness of the individual at the relevant point-in-time, which in law is ordinarily an issue of fact to be determined by the finder of fact. Since appellate courts do not engage in fact-finding, appellate review of subjective determinations is limited to sufficiency of the evidence review.

In contrast, an objective point-of-view is an abstract evaluation, divorced from the actual awareness of a particular individual. Because the "objective" determination is not based on the actual awareness of a particular individual, it is not a factual determination, and so is more appropriate to analysis by an appellate court.

There are examples throughout the law; three examples are discussed below.

a. Negligence. In Texas, "negligence" means failure to use ordinary care, that is, failing to do that which a person of ordinary prudence would have done under the same or similar circumstances or doing that which a person of ordinary prudence would not have done under the same or similar circumstances. "Ordinary care" means that degree of care that would be used by a person of ordinary prudence under the same or similar circumstances. The definition of "ordinary care" is redundant to the definition of "negligence." But both definitions involved objective standards,

requiring the fact finder to imagine an abstraction, the "person of ordinary prudence," and to imagine how such a person would have acted in the same or similar circumstances. So the standard of negligence is unrelated to the defendant's actual state-of-mind.

b. Gross Negligence. Under *Burke Royalty Co. v. Walls*, 616 S.W.2d 911, 922 (Tex. 1981), the essential feature of gross negligence was the mental attitude of the defendant--the defendant must know about the peril, while his acts or omissions show that he did not care. This was a subjective standard. In *Transportation Ins. Co. v. Moriel*, 879 S.W.2d 10, 23 (Tex. 1994), a seven-to-two majority of the Supreme Court held that gross negligence would henceforth require proof of two components: (1) viewed objectively from the actor's standpoint, the act or omission complained of must involve an extreme degree of risk, considering the probability and magnitude of the potential harm to others; and (2) the actor must have actual, subjective awareness of the risk involved, but nevertheless proceed in conscious indifference to the rights, safety, or welfare of others. Because the two grounds are conjunctively joined, both must exist to find gross negligence. The Court thus engrafted an objective standard onto the former subjective-only standard for gross negligence, with the result that findings of gross negligence could be reversed based on an objective standard that was more susceptible to appellate review than the subjective standard. The Legislature has codified the objective and subjective standards for gross negligence, in Tex. Civ. Prac. & Rem. Code § 41.001(11).

c. Recusal. Another example of subjective versus objective points-of-view relates to the grounds for recusal of Texas judges. Under Tex. R. Civ. P. 18b(2), a trial judge must recuse himself/herself in instances, among others: (a) if his impartiality might reasonably be questioned; or (b) if he has a personal bias or prejudice concerning the subject matter or a party, or personal knowledge of disputed evidentiary facts concerning the proceeding. The first ground is an objective standard, viewed from the perspective of a third person. The second ground is a subjective standard, having to do with the mental processes and emotions of the judge in question. *See Caperton v. A.T. Massey Coal Co.*, 129 S.Ct. 2252 (2009), where the U.S. Supreme Court side-stepped the subjective test for recusal applied by a lower court justice and and held, instead, that under an objective test the Due Process of Law required the lower court justice to recuse himself from the case.

7. Legal Duty. A legal duty is an obligation owed by one person to another person, as an individual or owner of a thing. Legal duties often arise in the context of liability suits for damages, but legal duties exist between family members, the individual and the government, and in many other significant relationships. Legal duties can issue from any aspect of government, from the Constitution on down to the raised hand of a traffic cop on a city street. Statutes create duties, and exceptions as well. Courts created duties, when deciding cases. In the tort system in America, there is a long-standing conflict between two different visions of legal duty: should judges decide the existence and extent of legal duties in their rulings on motions and in the instructions and questions submitted to juries; or should juries determine the existence and extent of duties in answering factual questions like liability, causation, and damages? The judge-versus jury question affects the power of appellate courts, because lower court decisions on "the law" are more susceptible to appellate review than are jurors' decisions on "the facts."

The Texas Supreme Court has said that "[t]he definition of a legal duty is an issue for the

court involving questions of legal policy."[398] The Court has characterized the process of determining common-law duty as "balancing the risk, forseeability, and likelihood of injury against the social utility of the actor's conduct, the magnitude of the burden of guarding against the injury, and the consequences of placing the burden on the defendant."[399] Legal duty is a powerful Commonplace where the law applicable to a legal dispute is not clearly established by a statute or case law precedent.

8. Causation. Causation has been a matter of deep concern for philosophers as long as human thoughts have been recorded. A cause is something that precedes and brings about an effect or a result. The legal system must deal with causation in a practical way, and it has developed special concepts of causation.

‣ First Cause – "First cause" is a philosophical concept of the uncreated or self-created cause to which all other of causes must ultimately be traced. The first cause is the stopping point of the infinite regression of causation.

‣ Sufficient Cause – A "sufficient cause" is a cause that, if it occurs, guarantees that the result follows; however, the existence of the result does not guarantee the existence of the that cause. Stated differently: if X is a sufficient cause of Y, then the presence of X necessarily implies the presence of Y. However, the existence of Y does not guarantee the presence of X, because another cause, Z, may be the cause of Y.

‣ Necessary Cause – A "necessary cause" is one that must be present for the effect to occur, but where the presence of the necessary cause does not necessitate the effect. If X is the necessary cause of Y, then the presence of Y necessarily implies the presence of X. The presence of X, however, does not imply that Y will occur.

‣ Contributing Cause – A "contributing cause" is a cause that is not a necessary or sufficient cause, but does contribute to the effect in question. To be contributory, a cause cannot, acting alone, bring about the result. A contributing cause must precede the effect, and altering the contributing cause must alter the effect.

‣ Direct Cause – For a cause to be direct, there must be no known variable intervening between the cause and the effect.

‣ Legal Cause – "Legal cause" is a cause that triggers some recognition by the legal system, for example liability for damages or criminal liability. There are policy reasons why the law may not recognize something as a legal cause when is was an actual cause. "At some point in the causal chain, the defendant's conduct or product may be too remotely connected with the plaintiff's injury to constitute legal causation." *Union Pump Co. v. Allbritton*, 898 S.W.2d 773, 775 (Tex. 1995).

‣ "But For" Cause – "But for" causation exists when the event in question could not have occurred without the act or omission in question occurring first. The test is a counterfactual Conditional: "If X had not happened, would Y have happened?" "But for" causation is another way of saying "necessary cause."

‣ Criminal Cause – Causation for criminal purposes is defined in Texas Penal Code § 6.04(a):

> A person is criminally responsible if the result would not have occurred but for his conduct, operating either alone or concurrently with another cause, unless the concurrent cause was clearly sufficient to produce the result and the conduct of the actor clearly insufficient.

This requires that the act or omission be a "but for" cause. However, it is not necessary for the act or omission standing alone to be a sufficient cause, as long as it is sufficient in combination with another cause, unless that other cause is sufficient standing alone and the actor's action standing alone is not.

‣ Cause-in-Fact – "Cause in fact means that the act or omission was a substantial factor in bringing about the injury and without which no harm would have occurred." *McClure v. Allied Stores of Texas, Inc.*, 608 S.W.2d 901, 903 (Tex. 1980). This concept of causation involves two component parts: subtantial factor and "but for" causation.

‣ Proximate Cause – "Proximate cause" is a concept used in negligence cases. Proximate cause incorporates two elements: cause-in-fact and foreseeability. *Southwest Key Program, Inc. v. Gil-Perez*, 81 S.W.3d 269, 274 (Tex. 2002). The test for foreseeability is whether a person of ordinary intelligence would have anticipated the danger his or her negligence creates. *Id.* at 274.

‣ Independent Intervening Cause – An "independent intervening cause" is a separate act or omission that breaks the direct connection between the defendant's actions and an injury or loss to another person. This cause may relieve the defendant of liability for the injury or loss

‣ Good Cause – "Good cause" is a legally sufficient reason. Good cause is often the burden placed upon a litigant ... to show why a request should be granted or an action excused.[400]

‣ Probable Cause – "Probable cause" is a legal standard used in criminal cases. Probable cause is required before a government official may search a person or his property. In this sense, probable cause is information sufficient to warrant a prudent person's belief that a search would reveal evidence of a crime or contraband. Probable cause is also required before the government may arrest and initiate criminal proceedings against a person. In this sense, probable cause means a reasonable belief that a person has committed a crime.

Causation is not a Logic concept. In a hypothetical proposition the Antecedent is the "reason" for the Consequent, and not the "cause" of the Consequent. To say that "P is the reason for Q" is a matter of Logic; to say that "P is the cause of Q" is a matter of science, or law.

9. Res Judicata Vs. Stare Decisis. In Texas, the doctrine of res judicata prohibits a party from litigating, in a later law suit, "not only on matters actually litigated, but also on causes of action or defenses which arise out of the same subject matter and which might have been litigated in the first suit." *Getty Oil Co. v. Insurance Co. of North America*, 845 S.W.2d 794, 798 (Tex. 1992). In contrast, the Supreme Court said in *Lubbock County v. Trammel's Lubbock Bail Bonds*, 80 S.W.3d 580, 585 (Tex. 2002), that "the doctrine of stare decisis dictates that once the Supreme Court announces a proposition of law, the decision is considered binding precedent. . . . However, circumstances occasionally dictate reevaluating and modifying prior decisions. This Court may modify judicially created doctrines . . . ." Stare decisis is the reason why individuals, companies, trade organizations, and interest groups file amicus curiae briefs in cases to which they are not a party. Third parties are not bound by res judicata to the outcome of the case, but they may be bound by the ruling in the case as a result of the doctrine of stare decisis.

10. The Principle of Parsimony. In science there is a widely-shared preference for favoring the simplest explanation of a phenomenon over more complicated ones.[401]

In philosophy, the least complex argument is the preferred one. In reasoning, when an outcome can be justified by a narrower rule or a broader one, there is a preference to use the narrower one. In law, there is a rule of interpretation that, if two statements in a writing cannot be reconciled, the specific statement prevails over the general statement. The rule applies both to statutes and to contracts. *Nelson v. Texas Employment Comm'n*, 290 S.W.2d 708, 711 (Tex. Civ. App.--Galveston 1956, writ ref'd) (statute); *Sefzick v. Mady Dev., L .P.*, 231 S.W.3d 456, 461 (Tex. App.--Dallas 2007, no pet.) (contract). The rationale was explained in *Sam Bassett Lumber Co. v. City of Houston*, 198 S.W.2d 879, 881 (Tex. 1947):

> [W]hen the law makes a general provision, apparently for all cases, and a special provision for a particular class, the general must yield to the special in so far as the particular class is concerned. This rule is based upon the principle that all acts and parts thereof must stand, if possible, each occupying its proper place, and that the intention of the Legislature is more clearly reflected by a particular statute than by a general one. Accordingly a specific act is properly regarded as an exception to, or qualification of, a general law on the same subject previously enacted. In such a case both statutes are permitted to stand, the general one being applicable to all cases except the particular one embraced in the specific act.

The rule, that in deciding cases constitutional questions are avoided if a non-constitutional basis for the decision is available, is an expression of the principle of parsimony.

11. Escaping a General Rule. If your adversary invokes a rule that works to your client's disadvantage, you can try to defeat the rule, and if that is not possible, then try to undercut it (weaken it) to the point that some other rule (that is more favorable to your client) is applied instead. In some situations, the best approach is to show that the facts of the case do not trigger the rule. Alternatively, you can find legal reasons why the rule does not apply. These arguments include waiver of the rule, as well as the failure to meet procedural requirements that are preconditions to asserting the rule. Sometimes you can find a superior rule that would block the adverse rule; examples would be federal preemption, conflict of laws principles, or contractual terms that supplant or modify the adverse rule. To confront the rule head-on, you can argue exceptions to the rule, to establish that the rule does not apply to your case. Failing that, you can attack your opponent's interpretation of the rule, by showing that vagueness or ambiguity in the language of the rule makes its application uncertain given the facts of the case, or by denying that definitions and other terms in the rule mean what your opponent contends they mean. You can also invoke policy arguments or appeals to equity that the court should not apply the rule to your client, or should modify the rule enough to allow your client to escape the rule, or should overturn the rule.

The following recent case demonstrates the difficulties that can arise from applying a rule that has exceptions that are vague enough to leave broad opportunities to escape the rule. In the case of *In re ADM Investor Services Inc.*, 304 S.W.3d 371 (Tex. 2010), the Supreme Court stated that a forum-selection clause is enforceable unless the party opposing enforcement of the clause can clearly show that (1) enforcement would be unreasonable or unjust, (2) the clause is invalid for reasons of fraud or overreaching, (3) enforcement would contravene a strong public policy of the forum where the suit was brought, or (4) the selected forum would be seriously inconvenient for trial. The Court stated the general rule and four exceptions.

Justice Willett called for the Court, in the next case, to specify the parameters of "seriously inconvenient" and "unreasonable or unjust" when a party is alleging a medical hardship as grounds to escape a forum selection clause. *Id.* at 377.

The following principles can serve to win by avoiding the merits of a dispute: waiver, estoppel, standing, ripeness, case or controversy (no advisory opinions), political question, and religious question.

12. Definitions. Definitions are symbols, words, or phrases used to define a symbol, word, or phrase in more familiar terms. There are five types of definitions: lexical or descriptive definitions (a dictionary definition, which explains how a word is actually used);[402] stipulative definitions (given by a writer or speaker to establish a special meaning for purposes of that document or speech);[403] persuasive definitions (designed to influence a person's attitude or feelings towards the subject matter);[404] precising definitions (removes vagueness by giving a more precise description);[405] and theoretical definitions (suggesting how a concept can and should be viewed in all circumstances).[406] Some legal arguments involve a fight over stipulative definitions that are really persuasive definitions in disguise, for example where the definition determines whether certain parties do or do not fall within the scope of the statute, rule of law, or contract term, that uses the defined word.

13. Converting Limitations on Governmental Power to Rights of Individuals. The main body of the American Constitution gives the central government certain powers, denies it other powers, and leaves other typical governmental powers unmentioned. The Bill of Rights limits the powers of the central government, sometimes by imposing limits, and sometimes by recognizing rights in individuals and the states. Over time, there has been a general shift in perspective, from the view that individuals are autonomous and should be free from governmental control except in certain areas of life, to the view that individuals have rights and that one function of government is to intervene in the lives of its citizens to be sure that those rights are met. These two perspectives were contrasted in the last series of presidential debates, when a citizen in a "town hall" format debate asked both candidates whether people had a right to health insurance coverage. One candidate said "no," the other "yes." Neither candidate mentioned the legal basis for his view. In keeping with the times, legal situations can arise where a prohibition reflects a right.

14. Using Supporting Rationales to Limit the Rule. Oftentimes a principle of law will be announced, together with a supporting rationale. An example is the Second Amendment to the U.S. Constitution, which reads:

> A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed.

The form of the statement is an Enthymeme, where a Conclusion is stated together with its Premise. The right to keep and bear arms is stated in unqualified terms. However, because this otherwise unqualified statement includes its rationale, some have interpreted the rule to be limited to its rationale, i.e.: only persons acting as part of a well regulated Militia are entitled to keep and bear arms. This reflects the risk that including an explanation of the rationale for a law in the statement of the law may later be seen as a limitation on the rule of law.

The same thing can happen with statements of intent, which are particularly popular as introductory terms in contracts. These

statements of intent can be used to resolve vagueness or ambiguity in the contract terms, but they can also be used to argue for broader or narrower applications of the operative contract terms. And yet draftsmen tend to focus less on general statements of intent at the beginning of the contract and more on the specific obligations in the operative part of the contract.

15. Appeal to Consistency. One of the fundamental underpinnings of law is consistency, meaning that the norms by which behavior will be judged are stable and thus may be relied upon in taking actions and planning the future. The principle of stare decisis is largely attributable to this need for consistency. An appeal to consistency is therefore a powerful legal argument when you want to have your case treated in the same way that similar cases have been treated in the past.

16. Appeal to Fairness. One of the oldest tenets of law in a free society is the idea of equal justice under the law. That is the "motto" engraved above the entrance to the United States Supreme Court. It is the source of Jefferson's assertion that 'all men are created equal." It is embodied in the Equal Protection Clause of the Fourteenth Amendment. It was an argument that Johnny Cochran made to the jury in the O.J. Simpson murder trial.[407] Equal justice under the law has a wonderful historical pedigree, dating back to Thucydides' HISTORY OF THE PELOPONNESIAN WAR, where he related a funeral oration by Pericles, the political leader of Athens, in 430 B.C.:

> Our constitution does not copy the laws of neighbouring states; we are rather a pattern to others than imitators ourselves. Its administration favours the many instead of the few; this is why it is called a democracy. If we look to the laws, they afford equal justice to all in their private differences; if no social standing, advancement in public life falls to reputation for capacity, class considerations not being allowed to interfere with merit; nor again does poverty bar the way, if a man is able to serve the state, he is not hindered by the obscurity of his condition.[408]

17. Appeal to Majority. "Majority rule" is a prevailing tenet of group action in our culture. See Section XXIII.B.5. Showing that a position has been adopted by a majority of jurisdictions is considered as justification for adopting a position. For example, in *El Chico Corp. v. Poole*, 732 S.W.2d 306, 310 (Tex. 1987), the Texas Supreme Court decided to impose tort liability on commercial purveyors of alcoholic beverages when a drunk patron drives away and causes injury. Justice Franklin Spears wrote:

> Of fifty American jurisdictions (including the District of Columbia and excluding Texas), twenty-nine recognize a common law cause of action against an alcoholic beverage purveyor for injuries caused by an intoxicated customer.FN1 Additionally, nineteen state legislatures have enacted civil dramshop liability,FN2 seven of which also have recognized a complementary and supplemental common law cause of action.FN3 In total, a civil cause of action exists in forty-one jurisdictions with a substantial majority basing the cause of action upon the common law principles of negligence, negligence per se, or both. Focusing on the carnage inflicted upon innocent victims by drunk drivers, courts have rejected the rationale supporting no liability as outdated and unrealistic and thus invalid. Injury to a third person is no longer unforeseeable in an age when death and destruction occasioned by drunk driving is so tragically frequent.

18. Invoking Trends. If a court is required to extend existing law or create new law to

resolve a legal dispute, a simple determination of a majority rule is often not satisfactory because new rules replace old rules very slowly. In these situations, courts and advocates often look to see whether there is a trend reflected in recent decisions of other jurisdictions. Fifty-state surveys can be used for this purpose.

D. ADAPTING RHETORICAL CONCEPTS TO LEGAL ARGUMENTATION. There are many more concepts of Rhetoric than there are opportunities to use them in legal argumentation. More generally, it is useful to remember that Enthymemes are truncated Syllogisms, and that Enthymemes can be used in deductive-type arguments where the conclusion is only possible or probable, and not certain. Another equally important aspect of Enthymemes comes from Aristotle's study of Rhetoric. Recall that Aristotle observed that effective speakers would adopt as the Premises of their Arguments propositions that the audience would naturally agree with, either intellectually or emotionally, which Aristotle called "Commonplaces." Law and life abound with potential Commonplaces. There is a host of legal Commonplaces--that-is, legal concepts and procedures--that can be used as Premises in a legal Argument. Then there are religious, historical, cultural, geographical, race-based, gender-based, class-based, and age-based Commonplaces, all available to use in legal arguments. Two rhetorical arguments used frequently in legal arguments are discussed below.

1. Reductio Ad Absurdum. In Logic, Reductio ad Absurdum is a form of indirect proof where an Argument is proved Sound by negating the Premise and showing that the negated Premise leads to a logical contradiction. In the bivalent world of Formal Logic, disproving the negative of the Premise proves that the Premise is true. In normal argument, as opposed to Formal Logic, Reductio is more often used by an advocate to refute the opponent's Argument, by taking the opponent's Argument and applying it to different Premises that lead to an absurd or undesirable result. This shows that the Argument is untenable. Used in this way the Argument is called "Reductio ad Incommodum," or reduction to an implausibility or anomoly.[409] One instance of this type of Reductio technique is the Straw Man Fallacy, where the changed Premise does not fairly represent the opponent's case. A Reductio attack, when used in a legal argument, is based on the tacit assumption that for the opponent's rule or Warrant (to use Informal Logic terminology) to be used in the present case, then consistency requires that it be used in all cases. The answer to this is that any rule or Warrant can have exceptions that avoids the extreme cases. A Reductio ad Absurdum can be imbedded in a question. Example: In a political speech, Abraham Lincoln answered the accusation that he was two-faced by asking the audience "If I were two-faced, would I be wearing this one?" This is a form of Reductio ad Absurdum, in which Lincoln assumed his opponent's Premise and showed that it led to an absurdity.

Example: in a presidential debate on October 13, 1988, the moderator, Bernard Shaw, asked Candidate Michael Dukakis, "Governor, if Kitty Dukakis were raped and murdered, would you favor an irrevocable death penalty for the killer?" Dukakis replied, "No, I don't, and I think you know that I've opposed the death penalty during all of my life", and went on to explain his stance.[410]

A somewhat facetious but nonetheless frequent form of Reductio is called "Reductio ad Hitlerum." This describes a discourse in which, at some point, one disputant will attempt to discredit the argument of another by drawing a parallel between the opponent's position and a view or policy held by the German Nazi party in the 1930s and 1940s.

This is really an ad Hominem attack, but popular usage treats it as a Reductio argument.

2. Using the Extreme to Reach the Middle. Argument to Moderation is the name of the Fallacy of accepting an argument because it lies between two competing positions. See Section XV.18. It is a common practice in negotiations and litigation to ask for more than you want in hopes that you will end up at a mid-point, between the parties' two extreme positions, that your client finds satisfactory. The thinking is that if you make a reasonable demand, and your opponent makes an unreasonable demand, that you will end up somewhere between the middle and your opponent's extreme. Therefore there is some risk in advocating a reasonable position when your opponent advocates an unreasonable one.

XXIV. REFRAMING. A mental framework is a conceptual structure that we impose on a situation. Lawyering and judging operate on mental frameworks that by training and habit we impose on disputes. In litigation, the plaintiff establishes the original frame by filing a claim detailing certain actions or inactions and asserting causes of action. The defendant may accept the plaintiff's framing, or the defendant may try to reframe the case in a different way, where the facts or the law work to better advantage. The appellate lawyer receives the case as it was framed by the trial lawyers and trial judge. That framing may be inescapable, or it may be most advantageous to the client. But in some instances the client will do better on appeal if the contest is reframed. Appellate judges face the same issue, faced with a frame established by the trial lawyers and judges or by the appellate lawyers. The appellate judges may want to consider reframing the case and disposing of it based on the principles that apply in the reframed conception of the case. This was done in *Katz v. United States*, involving incriminatory information gathered by the government by attaching an electronic listening device to the outside of a telephone booth. Justice Potter Stewart, writing for the Court, said:

> Because of the misleading way the issues have been formulated, the parties have attached great significance to the characterization of the telephone booth from which the petitioner placed his calls. The petitioner has strenuously argued that the booth was a 'constitutionally protected area.' The Government has maintained with equal vigor that it was not.FN8 But this effort to decide whether or not a given 'area,' viewed in the abstract, is 'constitutionally protected' deflects attention from the problem presented by this case.FN9 For the Fourth Amendment protects people, not places.[411]

XXV. A SYNTHESIS OF THE CONCEPTS DISCUSSED IN THIS ARTICLE. This Section attempts to synthesize the principles of Logic, Rhetoric, reasoning, and argumentation discussed in this Article.

A. CONSTRUCTING ARGUMENTS. Remember what the psychologists say about the two types of reasoning (see Section III), that is, the intellect versus feelings and experience. Try to construct an argument that appeals to both the conscious, deliberative, and analytical part of the audience as well as the part that is intuitive, automatic, natural, non-verbal, narrative, categorical, and experiential.

1. Preserve the Right to Argue. There is no opportunity to argue unless you preserve the right to argument. In appellate practice, that means preservation of error in the trial court.

2. Assemble the Facts. For the advocate, the desired conclusion is known from the start. For the judge, the desired conclusion should

come toward the end of the process. In either event, it is best to assemble the facts first, although having an eye on the conclusion or possible conclusions can affect which facts are sought and which facts are used in the argument.

3. Frame (or Reframe) the Problem. On appeal, regardless whether the client won or lost in the trial court, the advocate should evaluate the case to see if it was framed by the trial lawyers and trial judge in the way that is most advantageous to your client on appeal. If your client lost in the trial court, you may be able to reframe the case in the appellate court and win there. If your client won, but the victory is vulnerable to reversible, then try to reframe the case into a more favorable posture. For the appellate judge, reframing the case appropriately may mark the way to the ultimate disposition of the case. A case should not be reversed because it was framed wrongly; it should be reversed only if it reached the wrong result.

4. Determine Possible Then Preferable Arguments. Arguments work from Premises to Conclusions. In creating an Argument, you may need to start with the Conclusion you want in order to determine the Premises you need, but once the Premises are identified, the normal Argument asserts and then proves the Premises, and then shows how those Premises lead to the Conclusion. The Premises must be proven, or assumed for purposes of the Argument. Then the Argument is presented, consisting of deductions, or inductions, or analogies, or Enthymemes, or emotional appeals, or any combination of these. If the Premises are true (or probable), and the Argument Valid (or acceptable to the audience), then the Conclusion should follow. In constructing an Argument, it is helpful to determine whether the Logic is Deductive, Inductive, or Analogical. If Deductive, attention should be paid to whether the Premises and the Conclusion can be proven with certainty. If not, then the Argument should be formulated as Enthymemes, with a Conclusion that is highly-likely, or at least more probable than not. If the Argument is Inductive, then attention should be paid to the number and representativeness of the instances that are used to support the Conclusion. If the proof is Analogical, then attention should be paid to the number and relevance of similarities between the Source and the Target, and any dissimilarities that might be used to attack the analogy. Indirect proof involves stating your Premises clearly, then assuming that your Premises are false, and using an Argument to show that the false Premises lead to a logical contradiction or absurd consequence, which thus indirectly support the idea that, if your Argument is Valid, then your Premises must be true. An indirect argument will not be effective if it is too complex.

In Informal Logic you would identify your Claims (properly Qualified), Data, and Warrants. You would find the backing for your Warrants. You would identify and prepare for Rebuttals.

5. Identify Commonplaces to Use in the Argument. The principles of Rhetoric suggest that Arguments are best constructed using Commonplaces. You would identify themes that the audience will intuitively accept and make them your Premises or part of your Argument. Examples abound, but the poor guy litigating against the rich corporation might use a David-and-Goliath theme. A criminal defendant who is a member of a racial minority might reframe a prosecution from an issue of guilt-or-innocence to an issue of racial bias versus fairness, or the use of tainted evidence, as O.J. Simpson's attorneys did in his murder trial.

6. Select Rhetorical Tools. Attend to Ethos, Pathos, and Logos. Someone constructing an argument might lay out the rhetorical tools in

advance of constructing an argument like a surgeon might lay out a scalpel, clamps, and sponges in advance of the operation. Some rhetorical tools operate at the general level, like the Five Canons of Rhetoric. Other rhetorical tools are specific, like vivid examples, juxtaposition, contrast, climax, emphasis, etc. Tools must be picked to fit the occasion, and also to fit the style of the advocate, and also to fit the temperament of the audience. Rhetorical items could include analogies that simplify or clarify the issues. Analogies are also a way to introduce emotional elements into the process.

B. TESTING ARGUMENTS. A good argument wins only when it is not refuted. So part of constructing a winning argument is to anticipate counter-arguments. This allows you to construct your argument in a way that will protect weaknesses in your position. Revise your argument to eliminate the weaknesses, and if that is not possible, then construct your argument to contain the damage that might be caused by the counter-arguments.

Psychological experiments suggest that individuals working alone find it harder to develop counter-arguments than to develop supporting arguments.[412] The ancient Greeks developed a form of argumentation, called the "dialectic," to test arguments, find their flaws, and revise them or even replace them with better arguments. Later thinkers developed the sequence of thesis-antithesis-synthesis. A dialectic can be conducted alone, or with other persons. Find a colleague or friend to play the Devil's advocate. Conduct a mock trial or mock argument with a questioning audience. Broad experience, or experience arguing the opposite of your current position, helps in identifying counter-arguments.

C. PRESENTING ARGUMENTS. Arguments are prepared in writing and orally. Most of the rhetorical analysis has been on oral argumentation, but you can write with a "voice" that opens your written argument up to many of the tools of oral argumentation. Writing is better suited to a logical argument; oral is better suited to an emotional argument. However, the enduring popularity of written fiction shows that emotions can be conveyed through writing, if you know how to do it.

In presenting the argument, attend to Ethos, Pathos, and Logos.

D. REFUTING YOUR OPPONENT'S ARGUMENTS. In a normal refutation, you are seeking to have the audience reject our opponent's Conclusion. You can attack (i) the Conclusion, or (ii) the Premises, or (iii) the logic of the Argument connecting the Premises to the Conclusion. Under (i), you attack the opponent's Conclusion directly, by using evidence to show that the Conclusion is not true, or by showing that the Conclusion is not desirable for legal or moral reasons, and the like. Under (ii), you accept the opponent's Argument and attack one or more of the Premises, proving them to be false, or improbable. An example would be a claim that a sample used to support a statistical argument was too small to be representative of the relevant population, or was selected in a biased (non-random) manner. Another example would be attacking the credibility of an expert whose opinion is a Premise of the opposing Argument. Proving that a Premise is false means that the argument is Unsound. Proving a Premise to be unlikely means that the Argument is likely to be Unsound. It should be remembered that disproving a Premise does not establish that the opponent's Conclusion is false; however, in law the failure to support a claim with evidence is fatal to the claim. Under (iii), you attack your opponent's Argument, which is the reasoning used to connect the Premises to the Conclusion. One way to attack an Argument is to prove that it is Invalid, by showing that the Conclusion can be false when the Premises are true. This attack is somewhat

theoretical for many audiences. A better approach is to produce a vivid counter-example, which is a way of showing by specific instance that the Argument is not deductively Valid (because it does not necessarily lead to a true Conclusion). In some instances the opponent has protected her/himself against counter-examples by asserting less than 100% certainty of the Conclusion, in which event you must find more than sufficient counter-examples to reduce the probability below a successful level. One way to attack an Argument is to discredit it through the Reductio ad Absurdum process, by taking the opponent's Argument and applying it to hypothetical fact situations that show that the Argument can lead to absurd or undesirable consequences.

The rules of Rhetoric suggest that the audience may be induced to reject an argument based on non-rational considerations, like rejecting a Premise because of its source (i.e., the Genetic Fallacy), or rejecting an Argument because its Conclusion is inconsistent with the audience's preconceived beliefs.

Strictly speaking, a successful direct attack on your opponent's argument does not prove that your argument is a good one. However, if your opponent has the burden of persuasion, a successful attack means you win. If you have the burden of persuasion, and you merely defeat your opponent's rebuttal argument, you must still prove the merit of your argument.

XXVI. IMPORTANT DISTINCTIONS. In many instances the clarity of our thoughts can be improved by understanding the difference between terms that are similar and often confused. This is a form of disambiguation. See Section XXI. Here are some important distinctions.

Ambiguous vs. Vague. Applied to words or concepts, ambiguity involves a multiplicity of meaning, while vagueness is an indistinctness of meaning.[413]

Ambiguity vs. Equivocation. Ambiguity is a multiplicity of meanings of a word, while Equivocation occurs when someone uses the same term in different senses in an argument.

Ambiguity vs. Amphiboly. Ambiguity is a multiplicity of meaning at the word level, while Amphiboly is multiplicity of meaning at the sentence level. The uncertainty arising from Amphiboly has to do with the way the words are arranged. A frequent source of Amphiboly is the mixing of Universal and Particular Quantifiers in the same sentence.[414]

Conjunction vs. Disjunction. In Logic, Conjunction and Disjunction are two Logic Operators that connect Terms in a Proposition, or connect Propositions in a Compound Proposition. Conjunction joins terms; disjunction separates terms. Conjunction requires that all conjunctive elements be true for the condition stated in the conjunction to be met. Disjunction requires only one of the several conjunctive elements to be true for the condition stated in the disjunction to be met.

Consistent vs. Inconsistent. Two Logic Propositions are "Consistent" with each other when it is possible for both Propositions to be True. If it is not possible for both Propositions to be True, then the Propositions are "Inconsistent." Stated differently, if a Truth Table is constructed for the Conjunction of the two Propositions, if there is at least one row where the conjoined Propositions are True, then they are Consistent. If there is no such row, then they are Inconsistent.[415]

Contrary vs. Contradictory. In Logic, two Propositions are contraries if they cannot both be true but can both be false. Two

Propositions are contradictories if they cannot both be true and both be false.

Converse vs. Obverse. The Converse of a Categorical Proposition results from exchanging the subject and predicate terms of the Proposition. Example: the Converse of "P ⊃ Q" is "Q ⊃ P". The Obverse of a Categorical Proposition results from replacing the predicate term with its complement. Example: the Converse of "P ⊃ Q" is "P ⊃ ¬Q".

Conversion vs. Contraposition. Conversion is a Logic process in which a new Conditional Proposition is created by switching the subject and the predicate of the original Conditional Proposition. Example: the Converse of "P ⊃ Q" is "Q ⊃ P". Contraposition is a Logic process in which a new Conditional Proposition is created by switching the subject and predicate of a Proposition and then Negating both. Example: the Contrapositive of "P ⊃ Q" is "¬Q ⊃ ¬P". Example: Modus Tollens is the Contrapositive of Modus Ponens. The original Proposition and its Contrapositive are Logically Equivalent; the original Proposition and its Converse are not.

Cogent vs. Sound Argument. An inductive argument is "Cogent" when its Premises are true and the Conclusion is more likely to be true than not true. A deductive argument is "Sound" when its Premises are true and the truth of the Premises guarantees that the Conclusion is true.

Deduction vs. Induction vs. Analogy. Deduction is a form of reasoning or argumentation where the Conclusion follows by necessity from the Premises. Induction is a form of reasoning or argumentation where the likelihood that the Conclusion follows from the Premises is less than certain. In many instances, the likelihood can be assigned a probability. Analogy is a form of reasoning or argumentation where something unfamiliar is categorized based on its similarities and dissimilarities to things that are familiar and have already been categorized.

Deductive vs. Inductive Logic vs. Analogical Logic. Deductive Logic is based on the joining of two or more Premises in such a way that they suggest a necessary Conclusion. Inductive Logic is based on analyzing specific things and inferring from them general rules that apply to a wider group of things. Analogical Logic is based on comparing two specific instances, to see whether the similarities outweigh the differences so that they can both be treated the same way. Deductive Logic moves from the general to the specific, while Inductive Logic moves from the specific to the general, and Analogical Logic moves from the specific to the specific. Deductive Logic leads to Conclusions that are certain, while Inductive Logic leads to Conclusions that are at best probable, and Analogical Logic leads to a Conclusion that is limited to the items being compared.

Direct vs. Indirect Arguments. A Direct Argument consists of proof that the Premises support the Conclusion, either with certainty (in Deductive Logic) or to a high degree of probability (in Inductive Logic). Using Modus Tollens to disprove an Antecedent by disproving the Consequent is also a Direct Argument, called Proof by Contrapositive. An Indirect Argument, sometimes called "Proof by Contradiction" or "negation introduction," establishes the Soundness of a Logic Proposition by Negating the Premise and showing that the Negated Premise leads to a logical contradiction, thereby establishing that the Proposition as originally stated must be true.

Disjunction vs. Conjunction. A disjunction (like the English word "or") separates items, while a conjunction (like the English word "and") joins them. In Logic, Inclusive

Disjunction is a Operation contained in a Logic Proposition that results in the Proposition being True when one or more of the Terms of the Proposition are true. Exclusive Disjunction is a Logic Operation contained in a Logic Proposition that results in the Proposition being True when one and only one of the Terms of the Proposition are true. Conjunction is a Logic Operation inside a Logic Proposition that results in the Proposition being True only when all of the Terms of the Proposition are true.

Distributed vs. Undistributed. In Categorical Propositions, a Term is said to be Distributed if all members of that category are mentioned or accounted for. In the categorical statement "all men are mortal," the term "men" is distributed. Likewise, in the Statement "no men are immortal," the term "men" is distributed. A Term is "Undistributed" if not every member is mentioned or accounted for. See Section VII.B.7.

Equal vs. Equivalent. "Equal" means two things are the same. "Equivalent" means that two things are the same for some but not all purposes. In Logic, two Terms or Propositions are Logical Equivalents if they have identical Truth Tables.

Entailment vs. Implication. The term "entailment" was introduced by G.E. Moore, in his book PHILOSOPHICAL STUDIES 291 (1923). Moore likened "entailment" to the tie that exists between the Antecedent and the Conclusion in a Conditional Proposition, where the Antecedent is constructed by combining the two Premises of a Categorical Syllogism. From Deductive Logic we know that the relationship between the two Premises and the Conclusion of a Syllogism is one of necessity. Thus, "entailment" has been described in this way: "where P and Q are contingent propositions, P entails Q only when 'P and not-Q' is self-contradictory."[416] Entailment is thus the strongest form of Implication possible. In contrast, the term "Implication" has a multiplicity of meanings, including the Material Conditional, indicative Conditional, subjunctive Conditional, counter-factual Conditional, and more. In Logic, Implication is a relationship between the terms "P" and "Q" in which the occurrence or existence of "P" means the occurrence or existence of "Q". Usually written "P → Q" or "P ⊃ Q" where "P and Q" are Terms or Propositions. The Implication is True except when P (the Antecedent) is true and Q (the Consequent) is false. The strength of an Implication can range from slightly above zero to certainty. As used in Deductive Logic, the term Implication connotes certainty. As used in Inductive Logic, the term Implication connotes some degree of probability less than 100%.

Inclusive vs. Exclusive Disjunction. In Logic, two or more Statements or Propositions joined by Disjunction are true if at least one of the Statements of Propositions are true. Inclusive Disjunction allows the Statement or Proposition to be true if one or more of the components are true. Exclusive Disjunction allows the Statement or Proposition to be true if and only if just one of the components is true.

True vs. Valid vs. Sound. As applied to Statements, "true" means accurate in the real world. A Logic Proposition is True when the Truth Value of the Proposition, taken as a whole, is True given the Terms and the Logic Operations contained in the Proposition. A Logic Proposition is Valid when the Conclusion is true whenever the Premises are true. A Logic Proposition is Sound when it is logically Valid and the Premises are true.

Universal vs. Particular. Categorical Propositions have three quantifiers, that indicate how many of the subject category are included in the predicate category: all, none, and some. The two Universal quantifiers are

"all" and "none." The Particular quantifier is "some." See Section VII.B.7.

Valid vs. Sound. See "True vs. Valid vs. Sound."

Valid vs. Strong. A deductive proposition or argument is Valid if the Conclusion is always true when the Premises are true. An inductive proposition is Strong when it is improbable that the Premises are true and the Conclusion false.

XXVII. GLOSSARY.

Abduction - A term, invented by Charles Sanders Peirce, to describe perceptual judgments that suggest universal propositions through an intuitive process that is not subject to conscious awareness or control, and has an emotional component to it. See Section IX.

Abductive Reasoning - The process of forming an explanatory hypothesis, using an inductive-like process of moving from the particular to the general that has no assurance of Validity or Strength. See Section IX.

Ambiguity - A multiplicity of meaning. Distinguished from Vagueness. See Section XV.2. Also distinguished from Equivocation. See Section XV.22.

Analogy - In Logic, a method of reasoning that infers that because different items share some features they therefore share more features. See Section XI. In argumentation, analogy is an approach that says that, because something new is similar to something familiar, therefore the categories or rules associated with the familiar thing should apply to the new thing. See Section XIV.C.5.

Antecedent - The statement or Proposition "P" that is the subject of the Conditional Proposition "P implies Q" or "if P then Q". See Section VII.C.

Axiom - An Axiom, also called a "Postulate," is a statement regarded as being self-evidently true so that it need not be proved. In argumentation, using an Axiom puts a stop to the otherwise infinite regressing to some first premise (or First Cause). See Section VII.I.

Bayes' Formula - A method of calculating the Conditional Probability of event or condition "B" given the occurrence or existence of an event or condition "A", using the Prior Probability of "A", the Prior Probability of "B", and the Probability of "A" given "B". See Section X.B.1.

Case-Based Reasoning - The process of solving new problems based on the solutions to similar past problems. In law, the argument that the present case should be resolved using legal rules applied in an earlier case that is sufficiently similar.

Categorical Statement - A statement that includes the subject Term in, or excludes it from, the category described in the predicate Term. Must be in either A-, E-, I- or O-form, or their negation. See Section VII.B.

Conclusion - The ending point of a Logic Proposition or Logic Argument or rhetorical Argument. The conclusion of a rhetorical argument may not be the end of the reasoning process, where the ending is a restatement or summing up of the argument. See Section VII.A.

Conditionals - See "Conditional Proposition."

Conditional Probability - The probability of an event or condition given the occurrence or existence of another event or condition. See Section X.B.

Conditional Proposition - An Implication, expressed in Logic by "P implies Q" or "if P then Q", or in natural language by "Q only if P" or "Q provided that P". See Section VII.C.

Consequent - The statement or Logic Proposition "Q" that is the predicate of the Conditional Proposition "P implies Q" or "if P then Q". See Section VII.C.

Contradiction - a pair of propositions where one asserts what the other denies. "Contradictions do not exist. Whenever you think that you are facing a contradiction, check your premises. You will find that one of them is wrong." Ayn Rand, ATLAS SHRUGGED (1957). See Section VII.A.2.

Contrapositive - A Conditional Proposition created from another Conditional Proposition, by reversing and then Negating the subject and predicate of the first Conditional Proposition. Example: the Contrapositive of "P ⊃ Q" is "¬Q ⊃ ¬P". Proving the Contrapositive establishes that the original Premise "P" is false, in a form of proof called Modus Tollens. A Proposition and its Contrapositive are Logically Equivalent (i.e., have the same Truth Tables). See Sections VII.C.2 & XXVI.

Conversion - The process of exchanging the places of the subject and predicate terms in a categorical statement. See Sections XII.B.7 & XXVI.

Copula - The verb (a form of "to be") that joins the subject and predicate of a categorical statement. See Section VII.C.4.

Deductive Logic - See "Deductive Reasoning."

Deductive Reasoning - A form of reasoning in which two or more Premises are associated in such a way as to lead with certainty to a Conclusion. See Section VII.

Defeasible Argument - Argument that is rationally compelling but not Deductively Valid.[417] See Section XVII.B.

Defeasible Reasoning - A non-demonstrative form of reasoning that does not result in a final demonstration of a claim, but rather a provisional assertion of an argument that is subject to undercutting or rebuttal as further evidence is discovered or further arguments are brought to bear. See Section XVII.B.

Enthymeme - In Deductive Logic, a Syllogism that is missing a Premise, or missing parts of two or more Premises, or that implies that the Conclusion is only probable and not certain. See Section VII.B.3. In argumentation, an argument that utilizes themes that the rational component of the audience will identify with. See Section XIV.C.2.

Equivocation - Using the same term at different points of an argument, but in different senses. When this occurs in a Syllogism, it is the Fallacy of Four Terms. See Section XV.22.

Euler Circles - A way of depicting Categorical Propositions and syllogistic reasoning in a graphical manner, by using circles that represent each category used in the Proposition. See Section VII.D.

Fallacy - A flawed argument. Fallacies have been categorized. See Sections VII.B.10 (syllogistic), VII.K. (deductive), VIII.F (inductive), XV (argumentation), and XVI (alternate characterizations).

Fallacy of Relevance - An argument that is erroneous because the Premises are not sufficiently relevant to the Conclusion. See Section VII.M.

Implication - A relationship between two or more Terms or Propositions where the existence or occurrence of one means that the other exists or will occur. In natural English Implication is expresses as "P implies Q" or "if P then Q". In Symbolic Logic, Implication

is expressed "P → Q" or for Material Implication "P ⊃ Q". See Section VII.C.

Indirect Argument - validating a Logic Proposition by assuming the Proposition is false and showing by deductive argument that this leads to a logical contradiction. Also called "Proof by Contradiction." See Section XXIII.A.7.

Inductive Logic - See "Inductive Reasoning."

Inductive Reasoning - Inferring from particular instances a general principle that applies, with some degree of likelihood short of certainty, to a larger number of instances. See Section VIII. Statistical generalizations are a form of inductive reasoning, where a randomly-chosen sample is believed to represent an entire class of persons or things, to some degree of probability. See Section X. Some people see Reasoning by Analogy as a form of inductive reasoning where a given number of similarities between items being compared suggests that more similarities exist. See Section XI.

Invalid - A Deductive Proposition for which there is at least one instance where the Premises are true and the Conclusion is false. See Section VI.C.2.

Inverse - A Conditional Proposition formed by Negating both the subject and predicate of another Conditional Proposition. Example: the Inverse of "P ⊃ Q" is "¬P ⊃ ¬Q". See Section VII.C.2.

Law of Contradiction -

Law of the Excluded Middle -

Major Premise - The first Premise of a Syllogism that is in Standard Order, and which contains the Major Term. See Section VII.B.1.

Major Term - The Term that occurs in the predicate of the Major Premise of a Categorical Syllogism, and appears again in the predicate of the Conclusion. See Section VII.B.1.

Material Conditional - A Conditional Proposition that is true if and only if the Consequent is true whenever the Antecedent is true and the Antecedent is false whenever the Consequent is false. Expressed in Symbolic Logic as "P ⊃ Q " or "P ⇒ Q". See Section VII.C.3.

Middle Term - The Term that occurs in the subject of the Major Premise, and predicate of the Minor Premise, of a Categorical Syllogism, and which does not appear in the Conclusion. The Middle Term joins the Major Premise to the Minor Premise so that the Conclusion may be deduced. See Section VII.B.1.

Minor Premise - The second Premise of a Syllogism that is in Standard Order, and which contains the Minor Term. See Section VII.B.1.

Minor Term - The Term that occurs in the subject of the Minor Premise of a Categorical Syllogism, and appears again in the subject of the Conclusion. See Section VII.B.1.

Modus Ponens - A Conditional Proposition in the following form: "if P is true, then Q is true; P is shown to be true; therefore Q must be true". See Section VII.C.4.

Modus Tollens - A Conditional Proposition in the following form: "If P is true, then Q is true; Q is shown to be false; therefore, P is false". See Section VII.C.5.

Negation - In Logic, the opposite of the term or Proposition being Negated. Also, the process of reversing the Truth Value of a Logic Term, Proposition, or Compound Proposition. See Sections VII.F.1 & VII.Q.1.

Non Sequitur - An argument reflecting a Fallacy of Relevance. See Section VII.K.4.

Paradox - In Logic, a Valid argument that leads to a logical contradiction. In argumentation, a seemingly self-contradictory statement or argument that invites analysis of one's assumptions or reasoning. See Section VII.L.

Posterior Probability - A term from Bayesian Theory, meaning the Conditional Probability assigned to an event or condition after receiving additional information. See Section VII.L.

Premise - In Deductive Logic, a supposition from which something else results of necessity; the beginning point of an argument designed to lead inexorably from the Premise to a Conclusion that is by necessity true; a known fact from which other facts can be inferred.

Prior Probability - A term from Bayesian Theory, meaning the probability assigned to an event or condition before receiving additional information. See Section X.B.1.a.

Proposition - In Logic, a Statement that asserts a Logic-based relationship between Terms, or between two or more Propositions. See Section VI.B.

Reasoning by Analogy - See "Analogy."

Reductio ad Absurdum - In Logic, a form of argument in which a Proposition is disproven by showing that it leads to a logical contradiction. An Indirect Proof is a form of Reductio, in which an Argument is proved Sound by showing that negating the Premise leads to a logical contradiction. See Section XXIII.A.7. In argumentation, Reductio a refutation where an opponent's Argument is carried to the extreme and to show that it reaches an absurd or undesirable result. Technically, the latter form of argument is called "reductio ad incommodum." See Section XXIII.D.1.

Sampling Bias - An error in statistical generalization that results from the selection of a sample that is not representative of the population as a whole, because for some reason it is not randomly selected. See Section VIII.F.9.a(1).

Sorites - In Logic, a chain of incomplete Syllogisms in which the predicate of each Premise (except the first) is the subject of the next Premise, continuing until the Conclusion. See Sections VII.B.4 and XIV.C.3.

Sorites Paradox - A logic-based argument that exploits the vagueness associated with categories applied to a continuous phenomenon to show that focusing on incremental changes defeats the categorization scheme. See Section VII.L.1.

Sound - In Logic, a Proposition that is both Valid and has true Premises. See Section VI.C.3.

Square of Opposition - A diagram showing the possible relationships between the Premises and Conclusions of Categorical Syllogisms that are stated in the Standard Form. See Section VII.B.8.

Standard Form - The Standard Form is the configuration of a Categorical Proposition

into one of the four forms described as a A, E, I, and O. See Section VII.B.7.

Standard Order - The ordering of the parts of a Categorical Syllogism, with the Major Premise first, followed by the Minor Premise, and finally the Conclusion. See Section VII.B.1.

Strong - Said of an inductive argument where it is unlikely that the Premises could be true and the Conclusion false. See SectionVIII. "Strong" is the Inductive Logic analogue to the concept of "valid" in Deductive Logic, except that "valid" deals with certainty while "strong" deals with likelihood.

Syllogism - In Deductive Logic, a method of reasoning whereby the joining of two Premises establishes a Conclusion that necessarily follows. See Section VII.B.

Term - A component part of a Logic Proposition. A term can be a Statement or a Logic Proposition. See Section VII.A.1.

Truth Tables - A table listing the Truth Values of a Logic Proposition under all possible combinations of true and false Terms. See Section VII.E.

Truth Value - The truth or falsity or a Term or Logic Proposition. See Section VII.E.

Unsound - A deductive argument that is Valid but has false Premises. See Section VI.C.3.

Vagueness - An indistinctness of meaning. Distinguished from ambiguity. See Section XX.

Valid - A deductive argument for which, when the Premises are true, the Conclusion is necessarily true. See Section VI.C.2.

Warrant - Part of the structure of arguments proposed in 1958 by Stephen E. Toulmin and widely accepted in Informal Logic circles, in which arguments are constructed of three components--Claims, Data, and Warrants--where Warrants are the assumptions, or principles, or logical statements, or themes, that link the Data to the Claims. Warrants can be deductive or inductive inferences, an analogical comparison, an Enthymeme, or a principle or technique of Rhetoric. See Section XVII.A.3.

XXVIII. ENDNOTES.

1. The principles of Logic and of Rhetoric have been stated and restated so many times that the selection of a particular source as authority is arbitrary. In this Article, some citations are picked based on their most famous proponent, some based on the clarity of the source language, some based on the availability of the original writing on the internet (to permit confirmation by the reader), some based on historical significance, and some for entertainment value.

2. Where possible, references for further study are made to materials available for free on the internet. This convenience has a price: links go dead. If that happens, conduct an internet search using key words or phrases to find new materials for further study. The author recommends Google for internet-wide searches. Google is preferred over other search engines because of Google's access to Google Books, which gives access to copyrighted material. The date that the author of this article last accessed the URL is given in parenthesis, i.e. (8-10-2010).

3. *See* David R. Shanks, *Implicit Learning*, in K. Lamberts and R. Goldstone, HANDBOOK OF COGNITION p. 202 (2005) <http://www.psychol.ucl.ac.uk/david.shanks/Implicit%20learning%20review%20chapter.pdf> (8-1-2010), for a discussion of the "implicit learning" process.

4. Ian Tattersall, *Macroevolutionary Patterns, Exaptation, and Emergence in The Evolution of the Human Brain and Cognition*, in Stephen Cunnane (Ed.), Kathlyn Stewart (Ed.), THE EVOLUTION OF THE HUMAN BRAIN AND COGNITION, IN HUMAN BRAIN EVOLUTION : THE INFLUENCE OF FRESHWATER AND MARINE FOOD RESOURCES 2 (June 2010) <http://media.wiley.com/product_data/excerpt/84/04704526/0470452684.pdf> (8-1-2010).

5. Gottfrieb Leibniz,THE ART OF DISCOVERY (1685).

6. Magda Osman, *An evaluation of dual-process theories of reasoning*, 11 PSYCHONOMIC BULLETIN & REVIEW 988, 988 (2004) <http://pbr.psychonomic-journals.org/content/11/6/988.full.pdf> (8-1-2010). British theorist Jonathan St. B.T. Evans distinguishes *dual systems* from *dual processes*, and points out that the fact that people process information in two ways does necessarily mean that they have two separate cognitive systems. In fact, he suggests, the issue of whether there is one system or are two systems for processing information is not important to researchers attempting to account for experimental results. Evans proposes two reasoning processes, one heuristic (implicit) and one analytic (explicit). Evans proposes that people heuristically use incoming information to generate a plausible model, which they stick with until there is a good reason to replace it with another. Thus, deductive reasoning, instead of being the central intellectual activity, "may be seen as no more than an analytic-level strategy that bright people can be persuaded to adopt by the use of special instructions." In his view, "[d]eductive effort, when made, attempts to modify pragmatic processes, and not the other way around." Jonathan St. B. T. Evans, *The heuristic-analytic theory of reasoning: Extension and evaluation*, 13 PSYCHONOMIC BULLETIN & REVIEW 378 (2006) <http://pbr.psychonomic-journals.org/content/13/3/378.full.pdf> (8-18-2010).

7.Brian Ogren, *Aristotle's Rhetoric and the Cognition of Being: Human Emotions and the Rational-Irrational Dialectic*, 8 MINERVA - AN INTERNET JOURNAL OF PHILOSOPHY 1, 1-6 (2004) < http://www.mic.ul.ie/stephen/vol8/aristotle.pdf> (8-16-2010).

8. *Id.*

9. *Id.* p. 988-989. *See* Seymour Epstein, *Integration of the Cognitive and the Psychodynamic Unconscious*, 49 AMERICAN PSYCHOLOGIST 709 (1994) <http://ocean.st.usm.edu/~w535680/Epstein%20(1994).pdf> (8-1-2010).

10. Osman, *supra* n. 6 p. 988-989.

11. Osman, *supra* n. 6 p. 996.

12. Osman, *supra* n. 6 p. 995.

13. William Blackstone, COMMENTARIES ON THE LAW OF ENGLAND, Vol. I, Book I, Section III ["*Commentaries*"] <http://www.archive.org/details/blackstonescomm00unkngoog>. A version of Blackstone's *Commentaries* that can be electronically copied and pasted is at <http://avalon.law.yale.edu/subject_menus/blackstone.asp.> Alternate printings can be viewed at <http://openlibrary.org/works/OL2417578W/Commentaries_on_the_laws_of_England> (8-16-2010).

14. Blackstone, *COMMENTARIES*, Vol. I, Book I, Section III.

15. Blackstone, *COMMENTARIES*, Vol. I, Book I, Section III.

16. William Blackstone, *A Discourse on the Study of the Law* 16 (1758), <http://www.lonang.com/exlibris/blackstone/bla-001.htm> (6-19-2010) ["*Discourse*"].

17. Pollock and Maitland, THE HISTORY OF ENGLISH LAW BEFORE THE TIME OF EDWARD I 138 (1895).

18.Edward Rubin, *What's Wrong with Langdell's Method and What to do About it*, 60 VAND. L. REV. 609, 628-29 (2007) ("Rubin").

19. Littleton's *The Tenures* was one of the first books published in London and was the first legal treatise published on English law. The three volume set was an effort to achieve a comprehensive classification of rights in land. Littleton's approach was to state a definition and description of the rights in question, followed by hypothetical illustrations and in some instances references to some of the court decisions that had been assiduously recorded in "year books" for some years prior.

20. The first part is at <http://www.archive.org/details/firstpartinstit03nottgoog> (6-19-2010). The second part is at <http://www.archive.org/details/secondpartinsti02cokegoog.> (6-20-2010): The third part is at <http://www.archive.org/details/thirdpartinstit01cokegoog> (8-16-2010).

21. William Blackstone, *An Analysis of the Laws of England*, Preface p. v. Ranulf de Glanville (d. 1190) served as Chief Justiciar (i.e., prime minister) for Henry II of England. He is reputed to have authored the *Treatise on the Laws and Customs of the Kingdom of England* in 1188–the first treatise on English law. The Treatise detailed the complicated practice of writs, which were used to remove legal disputes from a local court (dominated by the local noble) to one of the King's Courts.

22. Blackstone, *An Analysis of the Laws of England*, Preface p. v <http://www.constitution.org/cmt/blackstone/ale1762.htm> (6-20-2010). Henry de Bracton (1210-1268) wrote a treatise in Latin *On the Laws and Customs of England* in around 1260. As a clerk to William de Raley, an important judge during the time of King Henry III, Bracton had access to the records of unpublished cases, which he used to annotate the statements of principles contained in his book. Bracton thus facilitated the development of the doctrine of stare decisis. He introduced the mens rea requirement for criminal conviction, and many other innovations.

23. Blackstone, *An Analysis of the Laws of England*, Preface p. v. "Britton" is the name attributed to the author of a comprehensive statements of laws, also given the name "Britton," that were published 1291-1292 by the authority of Edward I, in an effort to regularize the law across England and Ireland under his ultimate authority. Edward gave notice in the Prologue to the work that all contrary local laws were preempted. *See* Francis Morgan Nichols, *Britton* (1865) <http://www.archive.org/details/brittonenglishtr00nichiala> (6-19-2010). This 615-page book, written in Law French, gives a comprehensive listing of the remedies available from the courts, and through them the rights they vindicate. <www.archive.org/details/brittonenglishtr00nichiala>.

24. Blackstone, *An Analysis of the Laws of England*, Preface p. v.

25. Blackstone, *An Analysis of the Laws of England*, Preface p. v.

26. Blackstone, *An Analysis of the Laws of England*, Preface pp. v-vi

27. Blackstone, *An Analysis of the Laws of England*, Preface p. v.

28. Blackstone, *An Analysis of the Laws of England*, Preface p. vi.

29. Blackstone, *An Analysis of the Laws of England*, Preface p. v. *See A Memoir of Sir William Blackstone*, George Sharswood (1860) <www.archive.org/details/commentariesonl00shargoog> (8-16-2010).

30. Blackstone, COMMENTARIES, (Clarendon Press 2001, ed. Wayne Morrison,) Preface xxxvii-viii.

31. Blackstone, COMMENTARIES, p. xxxvii-viii.

32. Blackstone, COMMENTARIES, p. xxxvi.

33. Blackstone, *An Analysis of the Laws of England*, Preface p. iv.

34. Blackstone, *An Analysis of the Laws of England*, Preface p. xxxviii.

35. Blackstone, *An Analysis of the Laws of England*, Preface p. xxxviii.

36. Blackstone, *An Analysis of the Laws of England*,, Preface p. viii.

37. Blackstone, *An Analysis of the Laws of England*, Preface p. vii.

38. A scan of John Adams personal copy is on-line at <http://www.archive.org/stream/generalabridgmen06vine#page/n1/mode/2up> (8-16-2010).

39. <http://www.lonang.com/exlibris/blackstone/bla-001.htm> (6-19-2010) ["*Discourse*"].

40. Blackstone, *Discourse*, p.6.

41. Blackstone, *Discourse*, pp. 36-37.

42. <http://openlibrary.org/books/OL7025510M/Commentaries_on_the_laws_of_England.> (6-19-2010).

43.Thomas Aquinas, SUMMA THEOLOGICA Pt. I, Q. 90, Art. 4.

44. Blackstone, COMMENTARIES, Vol. I, Book I, Section II.

45. *Id.*

46. *Id.*

47. *Id.*

48. *Id.*

49. *Id.*

50. Blackstone, COMMENTARIES, Book I, Part I, Section III.

51. *Id.*

52. Blackstone, COMMENTARIES, Vol. I, Book I, Section II. Blackstone wrote: "The fairest and most rational method to interpret the will of the legislator, is by exploring his intentions at the time when the law was made, by signs the most natural and probable. And these signs are either the words, the context, the subject matter, the effects and consequence, or the spirit and reason of the law."

53. *Id*. William Blackstone said: "For it is an established rule to abide by former precedents, where the same points come again in litigation; as well to keep the scale of justice even and steady, and not liable to waver with every new judge's opinion; as also because the law in that case being solemnly declared and determined, what before was uncertain, and perhaps indifferent, is now become a permanent rule, which it is not in the breast of any subsequent judge to alter or vary from, according to his private sentiments: he being sworn to determine, not according to his own private judgment, but according to the known laws and customs of the land; not delegated to pronounce a new law, but to maintain and expound the old one. yet this rule admits of exception, where the former determination is most evidently contrary to reason; much more if it be contrary to the divine law. But even in such cases the subsequent judges do not pretend to make a new law, but to vindicate the old one from misrepresentation. For if it be found that the former decision is manifestly absurd or unjust, it is declared, not that such a sentence was bad law, but that it was not law; that is, that it is not the established custom of the realm, as has been erroneously determined."

54. Tucker's Blackstone can be accessed at <http://www.constitution.org/tb/tb-0000.htm> (6-20-2010).

55. Donald S. Lutz analyzed the European sources most cited by the Founding Fathers, and Blackstone finished third behind the Paul of Tarsus and Montesquieu. *See* <http://www.constitution.org/primarysources/influences.html> (8-16-2010). Daniel J. Boorstin, in the preface to the paperback edition of his book *The Mysterious Science of the Law* (Boston: Beacon Press, 1958) commented: "In the history of American institutions, no other book—except the Bible—has played so great a role as Blackstone's Commentaries on the Laws of England." Blackstone's image is carved into the frieze in the U.S. Supreme Court's courtroom, along with Justinian, Mohammed, Charlemagne, King John, St. Louis, Grotius, Marshall, and Napoleon. *See* <http://www.wm.edu/news/stories/newssidebars/2009/warren-speech-to-marshall-wythe-blackstone-ceremony,-sept.-1954.php> (8-16-2010).

56. The American Declaration of Independence begins: "When in the Course of human events it becomes necessary for one people to dissolve the political bands which have connected them with another and to assume among the powers of the earth, the separate and equal station to which *the Laws of Nature and of Nature's God* entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation." [Emphasis added]

57. In *The Federalist No. 84*, Alexander Hamilton quoted Blackstone: "'To bereave a man of life, [says he] or by violence to confiscate his estate, without accusation or trial, would be so gross and notorious an act of despotism, as must at once convey the alarm of tyranny throughout the whole nation; but confinement of the person, by secretly hurrying him to jail, where his sufferings are unknown or forgotten, is a less public, a less striking, and therefore a more dangerous engine of arbitrary government.' And as a remedy for this fatal evil he is everywhere peculiarly emphatical in his encomiums on the habeas corpus act, which in one place he calls 'the BULWARK of the British Constitution.'" Hamilton had previously quoted Blackstone in his letter of February 23, 1775, entitled "The Farmer Refuted." Hamilton quoted Blackstone to the effect "that the first and primary end of human laws, is to maintain and regulate these absolute rights of individuals."

58. *Marbury v. Madison*, 5 U.S. 137, 163, 1803 WL 893, *17 (1803) (quoting Blackstone's definition of writ of mandamus) .

59. Blackstone, COMMENTARIES, Vol. III, ch. 8.

60. Blackstone, COMMENTARIES, Vol. I, Book I, Section II.

61. Carl Landauer, *Social Science on a Lawyer's Bookshelf: Willard Hurst's Law and the Conditions of Freedom in the Nineteenth-Century United States* 18 LAW AND HISTORY REV. 59 n. 61 (2000). <http://www.historycooperative.org/journals/lhr/18.1/landauer.html#foot61> (6-20-2010).

62. The following is a letter from Abraham Lincoln to James T. Thornton on December 2, 1858:

> Dear Sir
> Yours of the 29th, written in behalf of Mr. John W. Widmer, is received. I am absent altogether too much to be a suitable instructor for a law student. When a man has reached the age that Mr. Widner has, and has already been doing for himself, my judgment is, that he reads the books for himself without an instructor. That is precisely the way I came to the law. Let Mr. Widner read Blackstone's Commentaries, Chitty's Pleadings's -- Greenleaf's Evidence, Story's Equity, and Story's Equity Pleading's, get a license, and go to the practice, and still keep reading. That is my judgment of the cheapest, quickest, and best way for Mr. Widner to make a lawyer of himself. Yours truly
> A. Lincoln

<http://showcase.netins.net/web/creative/lincoln/speeches/law.htm> (7/29/2010).

63.*See* Bruce A. Kimball, *Warn Students That I Entertain Heretical Opinions*, 25 LAW AND HISTORY REVIEW 1, 4 (2007) <http://www.historycooperative.org/journals/lhr/17.1/kimball.html> (8-12-2010): "But Langdell's mode of reasoning –even on issues traditionally invoked to demonstrate his formalism–is actually three-dimensional, exhibiting a comprehensive yet contradictory integration of induction from authority, deduction from principle, and analysis of justice and policy."

64. *Id.* at 19.

65. *Id.* at 21.

66. *Id.*, quoting Langdell, CASES ON CONTRACTS (1871), Preface.

67. *Id.* at 22-23, 37.

68. Oliver Wendell Holmes, Jr., *The Path of the Law,* 10 HARVARD LAW REVIEW 457 (1897).

69. "The common law is not a brooding omnipresence in the sky...," *Southern Pacific v. Jensen*, 244 U.S. 205, 222 (1917) (Holmes, J., dissenting).

70. "The life of the law has not been logic; it has been experience...The law embodies the story of a nation's development through many centuries, and it cannot be dealt with as if it contained only the axioms and corollaries of a book of mathematics." Oliver W. Holmes, Jr., THE COMMON LAW (1881), p. 1.

71. Professor Pound's 1908 Columbia Law Review article, entitled *Mechanical Jurisprudence*, is available on-line at Google Books, but the URL is unwieldy. Go to Google Books and search for "Roscoe Pound's Mechanical Jurisprudence."

72. Professor Corbin wrote: "[T]he law does not consist of a series of unchangeable rules or principles engraved upon an indestructible brass plate or, like the code of Hammurabi, upon a stone column. Every system of justice and of right is of human development, and the necessary corollary is that no known system is eternal. In the long history of the law can be observed the birth and death of legal principles. They move first with the uncertain steps of childhood, then enjoy a season of confident maturity, and finally pass tottering to the grave. . . . The law is merely a part of our changing civilization. The history of law is the history of . . . society. Legal principles represent the prevailing mores of the time, and with the mores they must necessarily be born, survive for the appointed season, and perish." Arthur L. Corbin, ANSON ON CONTRACTS v-vi (3d Am. ed. 1919)." Corbin wrote in a private letter: "I have read all the contract cases for the last 12 years; and I know that 'certainty' does not exist and the illusion perpetrates injustice." *See* Joseph M. Perillo, *Twelve Letters From Arthur L. Corbin to Robert Braucher*, 50 WASH. & LEE L. REV. 755 (1993).

73.Edward H. Levi, AN INTRODUCTION TO LEGAL REASONING 12 (1949).

74. Professor Levi described the process this way: "It is a three-step process described by the doctrine of precedent in which a proposition descriptive of the first case is made to a rule of Harvard then applied to a next similar situation. The steps are these: similarity is seen between cases; next the rule of law inherent in the first case is announced; then the rule of law is made applicable to the second case." *Id.* at 11. Professor Levi said this process had a dynamic quality "because the scope of the rule of law, and therefore its meaning, depends upon a determination of what facts will be considered similar to those present when the rules was first announced. The finding of similarity or difference is the key step in the legal process." *Id*.

75. U.S. Supreme Court Associate Justice Stephen Breyer recently said that "law is an example of reasoned power." Panel Discussion, *Law vs. Power: Who Rules? Who Makes the Rules?* (November 1, 2009) <http://fora.tv/2009/11/21/Law_Versus_Power#chapter_05> (8-1-2010).

76. See Zarefsky n. David Zarefsky, 2 ARGUMENTATION: THE STUDY OF EFFECTIVE REASONING 176 (2d ed. The Teaching Company 2005) <http://www.teach12.com> (8-17-2010).

77. Aristotle, POSTERIOR ANALYTICS Book I, Part 1 <http://classics.mit.edu/Aristotle/posterior.1.i.html> (8-7-2010).

78. Logical systems have been devised that do not assume that an assertion must be either true or false. Such systems are not covered in this Article.

79. Logical systems have been devised that do not assume that all logical Propositions have a Truth Value. One such system asks whether a connection between Statements or Propositions is "necessary." Another system includes a parameter reflecting the "relevance" of the Terms being connected in a Proposition. Such systems are excluded from this Article.

80. The first Premise is also false, in that ostriches have wings but cannot fly.

81. In the English language, verbs have four "moods": indicative, imperative, subjunctive, and infinitive.

82.This is the Logic rule known as Modus Tollens. See Section VII.C.5.

83. Note how the present tense "fits" better with declarative statements, while the future tense "fits" better with conditional statements.

84. In this Article, the term "Statement" is used for a clause or sentence that appears as part of a Logical Proposition, and that can be said to be true or false in the real world. Thus, in this Article the phrase "red blueberries" would be considered to be a logical Statement, even though it is not a complete sentence.

85. Stanford Encyclopedia of Philosophy, *Aristotle's Logic* <http://plato.stanford.edu/entries/aristotle-logic> (8-16-2010).

86. The Proposition that "A is A" is called a "Tautology."

87. Aristotle, METAPHYSICS 4.4, W.D. Ross (trans.), GBWW 8, 525–526.

88. Under the Law of Contradiction, "A" and "not-A" are "mutually exclusive."

89. Under the Law of Excluded Middle, "A" and "not-A" are "collectively exhaustive."

90. *See* <http://www.thelogician.net/2_future_logic/2_chapter_02.htm> (8-16-10).

91. This Rule of Inference is called "Modus Ponens." See Section VII.C.4.

92. This is the Rule of Inference called "Modus Tollens." See Section VII.C.5.

93. So-called "birthers," who believe that President Obama was born in Kenya, would say that this Syllogism "Begs the Question," in that it assumes what it purports to prove, i.e., that President Obama was born in America.

94. <http://classics.mit.edu/Aristotle/prior.mb.txt> (8-16-2010).

95. *Aristotle's Metaphysics*, Stanford Encyclopedia of Philosophy <http://plato.stanford.edu/entries/aristotle-metaphysics> (8-7-2010).

96. Roy A. Sorenson, *Are Enthymemes Arguments?*, 29 NOTRE DAME JOURNAL OF FORMAL LOGIC 155, 155 (1988) <http://projecteuclid.org/euclid.ndjfl/1093637779> (8-17-2010)

97. *See* <http://yesfine.com/carroll_symbolic_logic_simplified_statements.htm> (8-12-2010).

98. *See* Francine F. Abeles, *Lewis Carroll's Method of Trees: its Origins in Studies in Logic*, 1 MODERN LOGIC 25 (1990) <http://projecteuclid.org/DPubS/Repository/1.0/Disseminate?view=body&id=pdf_1&handle=euclid.rml/1204834538> (7-4-2010).

99. Conclusion: babies cannot manage crockodiles.

100. Conclusion: none of my presents are of tin.

101. Conclusion: all of my potatoes are old.

102. Conclusion: none of your sons are fit to serve on a jury.

103. Conclusion: no bird in this aviary lives on mince pies.

104. Conclusion: these sorites-examples are difficult.

105. Conclusion: all my dreams come true.

106. The Validity of a Disjunctive Syllogism can depend on context. When Neil Armstrong was standing on the moon, his sense of day and night was quite different from persons on Earth.

107. *The Traditional Square of Opposition*, Stanford Encyclopedia of Philosophy <http://plato.stanford.edu/entries/square> (8-6-2010).

108. The conventional translation from Aristotle's DE INTERPRETATIONE for I is "Some S is P". This creates problems when S is a set containing no members. *Id.* p. 5. However, one translator phrased the English "Not every S is P", which makes the problem go away. *Id.*

109. *Id.* at 2-3.

110. *Id.* at 3.

111. Aristotle, POSTERIOR ANALYTICS Book I, Part 3 <http://classics.mit.edu/Aristotle/posterior.1.i.html> (8-7-2011).

112. <http://www.fallacyfiles.org/undismid.html> (8-5-2010).

113. Osman, *supra* n. 6 p. 1001.

114. See Aldisert, Clowney, and Peterson, *Logic for Law Students: How to Think Like a Lawyer*, 69 UNIV. PITT. L. REV. 1, 1-13 (2007).

115. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 592-593 (1993) (quoting Karl Popper for the proposition that "the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability").

116. People commonly assume that disproving the Antecedent disproves the Consequent as well. This is incorrect. Disproving the Antecedent proves that the Conditional is Unsound. However, even an Unsound Proposition may have a Conclusion that is true. Thus, disproving the Antecedent does *not* prove that the Conclusion is false.

117. It is commonly assumed that showing the Implication relationship to be Invalid disproves the Consequent. This is incorrect. An Implication is Invalid when there is *at least one* instance where the Antecedent is true and the Consequent is false. Thus, an Invalid Implication may have a Conclusion that is true 99% of the time.

118. *Gene Harmon Ford, Inc., v. David McDavid Nissan, Inc.*, 997 S.W.2d 298, 306 n. 10 (Tex. App.--Austin, 1999, pet. denied). See Joseph Heller, CATCH-22 46 (1961).

119. <http://www.washingtonpost.com/ac2/wp-dyn/A37288-2002Dec10?language=printer> (8-16-2010).

120. Tex. Code. Crim. P. art. 38.03.

121. Tex. Fam. Code § 3.003(a).

122. *Diagrams*, Stanford Encyclopedia of Philosophy <http://plato.stanford.edu/entries/diagrams> (8-15-2010); Mario Savio, *AE (Aristotle-Euler) Diagrams: An Alternative Complete Method for the Categorical Syllogism*, 30 Notre Dame J. Formal Logic 581 (1998) http://projecteuclid.org/DPubS/Repository/1.0/Disseminate?view=body&id=pdf_1&handle=euclid.ndjfl/1039118872 (8-16-2010).

123.Note that it is sometimes easier to see a Fallacy using real life examples rather than abstract variables.

124. <http://www.butte.edu/~wmwu/iLogic/3.2/iLogic_3_2.html> (8-7-2010).

125. "Idempotence" is the property of something that has the same effect if used multiple times as if it was used only once.

126. <www.eartham.edu/upeters/courses/log/transtip.htm> (8-12-2010).

127. "Idempotence" is the property of something that has the same effect if used multiple times as if it was used only once.

128. Tex. Fam. Code § 1.104.

129. <http://mathworld.wolfram.com/Axiom.html> (8-12-2010).

130. John Stuart Mill, ON FALLACIES ch. 3, § 1 (1843) <http://oll.libertyfund.org/title/247/40031> (8-12-2010).

131. The author of the words, Thomas Jefferson, originally wrote "we hold these truths to be sacred and undeniable." Benjamin Franklin changed "sacred and undeniable" to "self-evident." <http://www.princeton.edu/~tjpapers/declaration/declaration1.gif>. The passage also contains the assertion that men are not just born but instead are created by a Creator.

132. <www.iep.utm.edu/prop-log>, p. 13.

133. <www.iep.utm.edu/prop-log>, p. 12.

134. <www.iep.utm.edu/prop-log>, p. 13 (8-12-2010).

135. The "Converse" of a Categorical Proposition exchanges the Term in the subject and the Term in the predicate. For example, the Converse of "P implies Q" is "Q implies P", or the Converse of "Some S is P" is "Some P is S".

136.John Nolt, Dennis Rohatyn, Achille Varzi, THEORY AND PROBLEMS OF LOGIC 92-93 (2d ed. 1998) ["Nolt"].

137. See Internet Encyclopedia of Philosophy <http://www.iep.utm.edu/fallacy> (8-7-2010).

138. See <http://mathworld.wolfram.com/Fallacy.html> (8-12-2010).

139. In *U.S. v. Kincade*, 379 F.3d 813, 873 (9th Cir. 2004) (Kozinski, J., dissenting), Judge Kozinski used a slippery slope argument, that the court's condoning the government's expansive use of DNA technology would set a new baseline of acceptable abridgement of privacy rights that would become the foundation for subsequent expansion of the government's authority to intrude. His quotation: "Not only do [Fourth Amendment opinions] reflect today's values by giving effect to people's reasonable expectations of privacy, they also shape future values by changing our experience and altering what we come to expect from our government." *Id.* at 873.

140. Eugene Volokh, *The Mechanisms of the Slippery Slope*, 116 HARV. L. REV. 1026 (2003); Ruth E. Sternglantz, *Raining on the Parade of Horribles: of Slippery Slopes, Faux Slopes, and Justice Scalia's Dissent in Lawrence v. Texas*, 153 UNIV. OF PENN. L. REV. 1097 (2005).

141. John Stuart Mill, ON FALLACIES ch. 6, § 4 (1843) <http://oll.libertyfund.org/title/247/40039> (8-12-2010).

142. Jason Glenn, *Many Judges Sometimes Lie: Remarks on Sorensen's Views on Vagueness and Law* (2007) <www.sorites.org/Issue__18/glenn.htm> (8-17-2010).

143. *Sorites Paradox*, Stanford Encyclopedia of Philosophy <http://plato.stanford.edu/entries/sorites-paradox/#1> (8-7-2010).

144. The attribution of this epistle to Paul has been questioned. See http://en.wikipedia.org/wiki/Epistle_to_Titus#Pauline_Authenticity. (8-17-2010).

145. See Internet Encyclopedia of Philosophy <http://www.iep.utm.edu/par-liar/> (8-7-2010).

146. *See*<http://www.statemaster.com/encyclopedia/Autoinfanticide> (8-12-2010).

147. *Two envelopes problem* <http://en.wikipedia.org/wiki/Two_envelopes_problem> (8-7-2010).

148. *Exchange paradox*, <http://en.wikipedia.org/wiki/Exchange_paradox> (8-7-2010).

149. Interestingly, the same pattern occurred with Lincoln's Emancipation Proclamation, which was difficult (if not impossible) to justify under the Constitution prior to the adoption of the Thirteenth Amendment. His first Emancipation Proclamation was essentially an offer of compromise to the states in rebellion. In his final Emancipation Proclamation, Lincoln "freed" the slaves in states that did not recognize his executive authority, while leaving in bondage the slaves in Tennessee, Maryland, and Delaware, which did recognize his Executive Authority. Thus, the Emancipation Proclamation freed no slaves. This and many other of Lincoln's actions as President reflect his sophisticated sense of legal reasoning, just as his political and Presidential speeches reflect his consummate skill in Rhetoric. Based on his career as a successful lawyer and his actions and statements as President, one could justifiably say that Lincoln was the greatest lawyer that America ever produced.

150. Nolt, *supra* n. 135 p. 33.

151. Nolt, *supra* n. 135 pp. 33-34.

152. Audun Jøsang, *Conditional Reasoning with Subjective Logic*, 15 J. OF MULTIPLE-VALUED LOGIC AND SOFT COMPUTING 2 (2008) <http://persons.unik.no/josang/papers/Jos2008-JMVLSC.pdf> (8-6-2010).

153. Ruth M. J. Byrne and Alessandra Tasso, *Deductive reasoning with factual, possible, and counterfactual conditionals*, 27 MEMORY & COGNITION 726, 727 (1999) <http://www.tara.tcd.ie/bitstream/2262/39510/1/Deductive%20reasoning%20with%20factual,%20possible,%20and%20counterfactual%20conditionals.pdf> (8-7-2010).

154. *Id.*

155. Ruth M. J. Byrne, *Deductive reasoning with factual, possible, and counterfactual conditionals*, 27 MEMORY & COGNITION 726 (1999) <http://www.tara.tcd.ie/bitstream/2262/39510/1/Deductive%20reasoning%20with%20factual,%20possible,%20and%20counterfactual%20conditionals.pdf> (8-18-2010).

156. *See* Douglas Walton, FUNDAMENTALS OF CRITICAL ARGUMENTATION 7 (2006).

157. Huhn, *The Stages of Legal Reasoning: Formalism, Analogy, and Realism*, 48, VILL. L. REV. 305, 309 (2003).

158.Sangeet Khemlani & P.N. Johnson-Laird, *Disjunctive Illusory Inferences and How to Eliminate Them*, 37 MEMORY & COGNITION 615, 615 (2009).

159.*Id.* at 616.

160.*Id.* at 614.

161. Hugo Mercier and Dan Sperber, *Why do humans reason? Arguments for an argumentative theory*, BEHAVIORAL AND BRAIN SCIENCES p. 14 (2010) <http://www.dan.sperber.fr/wp-content/uploads/2009/10/MercierSperberWhydohumansreason.pdf> (8-17-2010).

162. Turn the "8-card" and the "brown card." The "3-card" will not validate or invalidate the conditional. The "red card" will not validate or invalidate the conditional either, because even if the reverse of the "red card" is an odd number, it doesn't address the Conditional, which only applies when the Antecedent is an even number. If the brown card has an even number on the reverse side, it will invalidate the Conditional, because the Antecedent (8) will be true when the Consequent (reverse side) is false.

163. Osman, *supra* n.6 p. 1002.

164. Osman, *supra* n. 6 p. 1002.

165. Osman, *supra* n. 6 p. 1001.

166. Aidan Feeney (Ed.), Evan Heit (Ed), INDUCTIVE REASONING: EXPERIMENTAL, DEVELOPMENTAL, AND COMPUTATIONAL APPROACHES xiii (1990).

167. John Stuart Mill, A SYSTEM OF LOGIC, Book 3, ch. 2, § 1 <http://oll.libertyfund.org/title/246/39835> (8-12-2010).

168. This conceptualization was taken from a letter of Charles Sanders Peirce in 1905. See *Abduction* <http://www.helsinki.fi/science/commens/terms/abduction.html> (8-9-2010).

169. <http://www.mhhe.com/mayfieldpub/ct/ch11/glossary.htm> (8-9-2010).

170. John L. Pollock, *Defeasible Reasoning* 2 < http://oscarhome.soc-sci.arizona.edu/ftp/PAPERS/Defeasible%20Reasoning-Adler&Rips.pdf> (8-16-2010).

171. Mercier, *supra* n. 160 p. 15.

172. *See Spatial Cognition and Computation* <http://www.sis.pitt.edu/~scc> (8-17-2010); *Memory and Cognition* <http://mc.psychonomic-journals.org> (8-18-2010).

173. <http://www.nizkor.org/features/fallacies/ignoring-a-common-cause.html> (8-12-2010).

174. Jøsang, *supra* n. 151 p. 4

175. Osman, *supra* n. 6 p. 1000.

176. *Id.*

177. *Id.*

178. Bruce D. Burns and Bryan Corpus, *Randomness and inductions from streaks: "Gambler's fallacy" versus "hot hand,"* 11 PSYCHONOMIC BULLETIN & REVIEW 179, 179 (2004).

179. *Id.* at 170.

180. *Id.* at 182.

181. Jonathan J. Koehler, *Misconceptions About Statistics and Statistical Evidence* (2007) (draft) <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.140.215&rep=rep1&type=pdf> (8-9-2010).

182. *Id*. at 3-4.

183. *Id*. at 4-5.

184. *Id.* at 6-7.

185. *Id*. at 8-9.

186. *Id.* at 10.

187. *Id.* at 12.

188. *Id*. at 12-14.

189. *Id*. at 14-15

190. *Id.* at 15-16.

191. Bertrand Russell described Peirce as "the greatest American thinker ever." Karl Popper called him "one of the greatest philosophers of all time." <http://en.wikipedia.org/wiki/Charles_Sanders_Peirce> (8-9-2010).

192. Charles S. Peirce, quoted in Thomas Sebcok, *You Know My Method: A Juxtaposition of Charles S. Peirce and Sherlock Holmes*, p. 8 <http://www.aber.ac.uk/media/Documents/short/abduction.html> (8-9-2010).

193. *Id*. at p. 8.

194. *Id.*

195. Abduction <http://www.helsinki.fi/science/commens/terms/abduction.html> (8-9-2010).

196. *Id.*

197. *Id.*

198. Taken from Peirce's 1903 lecutres at Harvard <http://www.helsinki.fi/science/commens/terms/abduction.html> (8-9-2010).

199. Charles S. Peirce, quoted in Thomas Sebcok, *You Know My Method: A Juxtaposition of Charles S. Peirce and Sherlock Holmes*, p. 8 <http://www.aber.ac.uk/media/Documents/short/abduction.html> (8-9-2010).

200. Charles S. Peirce, quoted in Thomas Sebcok, *You Know My Method: A Juxtaposition of Charles S. Peirce and Sherlock Holmes*, p. 25 <http://www.aber.ac.uk/media/Documents/short/abduction.html> (8-9-2010).

201. James Hawthorne, *Stanford Encyclopedia of Philosophy*, *Inductive Logic* p. 8 (2008) <http://plato.stanford.edu/entries/logic-inductive> (8-17-2010) ("Hawthorne").

202. *Id.* at 11.

203. All of the following quoted material regarding the Monty Hall Dilemma comes from the following URL: <http://www.marilynvossavant.com/forum/viewtopic.php?t=64&postdays=0&postorder=asc&start=0&sid=bc22dd63985958bf395e9e22dc5b0024> (8-7-2010).

204. Hawthorne, *supra* n. 200 pp. 21-25.

205. Ulrike Hahn, Adam J.L. Harris, Adam Corner, *Argument Content and Argument Source: An Exploration*, 29 INFORMAL LOGIC 337, 340 (2009) <http://www.phaenex.uwindsor.ca/ojs/leddy/index.php/informal_logic/article/download/2903/2340> (8-6-2010).

206. <http://en.wikipedia.org/wiki/Bayesian_probability> (8-6-2010).

207. Bayes' Rule Calculator <http://stattrek.com/Tools/BayesRuleCalculator.aspx> (8-17-2010).

208. Gaëlle Villejoubert and David R. Mandel, *The Inverse Fallacy: An Account of Deviations From Bayes's Theorem and the Additivity Principle*, 30 MEMORY AND COGNITION 171, 171 (2002) <http://mc.psychonomic-journals.org/content/30/2/171.full.pdf> (8-17-2010).

209. Jøsang, *supra* n.151 p. 2.

210. Hahn, *supra* n. 204 p. 341.

211. Fabrizio Macagno and Douglas Walton, *Argument From Analogy in Law: The Classical Tradition, and Recent Theories* 42 PHILOSOPHY AND RHETORIC 158 (2009) <http://www.dougwalton.ca/papers%20in%20pdf/09Analogy.pdf> (8-15-2010).

212. John Stuart Mill, A SYSTEM OF LOGIC Book III, ch. 20 §§ 2 & 3 <http://oll.libertyfund.org/title/246/39874> (8-12-2010).

213. *Id.*

214. John Stuart Mill, A SYSTEM OF LOGIC Book III, ch. 20 § 3 <http://oll.libertyfund.org/title/246/39874> (8-12-2010).

215. *Id.*

216. Aldisert, *supra* n.114 p. 17.

217. *Kyllo v. U.S.*, 533 U.S. 27, 28 (2001).

218. *Avenell v. Chrisman Properties, L.L.C.* 2010 WL 1379972 *4 (Tex. App.--Houston [14 Dist.] 2010, no pet.).

219. Leo Groarke, *Argumentation Schemes* <http://philosophysother.blogspot.com/2009/03/groarke-leo-review-of-douglas-walton-et.html> (8-6-2010).

220. Hahn, *supra* n. 204 p. 341.

221. Patrick Bondy, *Truth and Argument Evaluation*, 30 INFORMAL LOGIC 142, 142 (2010) <http://www.phaenex.uwindsor.ca/ojs/leddy/index.php/informal_logic/article/download/2931/2406> (8-6-2010).

222. Julie Dickson, *Interpretation and Coherance in Legal Reasoning*, <http://plato.stanford.edu/entrier/legal-reas-interpret> (8-16-2010).

223. *Jessen Associates, Inc. v. Bullock*, 531 S.W.2d 593, 599 (Tex. 1976) ("A fundamental rule in the construction of statutes is to ascertain and give effect to the intent of the Legislature").

224. *United States v. American Trucking Ass'ns*, 310 U.S. 534, 541-44 (1939).

225. *United States v. Fisher*, 6 U.S. (2 Cranch) 358, 386 (1805).

226. *Simmons v. Arnim*, 220 S.W. 66, 70 (Tex. 1920).

227. Caleb Nelson, *Statutory Interpretation and Decision Theory*, 74 UNIV. OF CHICAGO L. REV. 329, 353 (2007).

228. *See* Nelson, *supra* n. 226 p. 336.

229. See R. Posner, THE PROBLEMS OF JURISPRUDENCE 268 n. 10 (1990) ("Statutory drafting is often a rushed and careless process").

230. *General Chemical Corp. v. De La Lastra*, 852 S.W.2d 916, 923 (Tex. 1993).

231. E. Levi, AN INTRODUCTION TO LEGAL REASONING 31 (1949).

232. Benjamin Cardozo, THE NATURE OF THE JUDICIAL PROCESS 15 (1921) (quoting Gray, NATURE AND SOURCES OF THE LAW).

233. Stephen Breyer, ACTIVE LIBERTY: INTERPRETING OUR DEMOCRATIC CONSTITUTION 88 (2005).

234. Stephen Breyer, *On the Uses of Legislative History in Interpreting Statutes*, 65 S.CAL.L.REV. 845, 861 (1992).

235. *Id.* at 865.

236. Nelson, *supra* n. 226 at 349.

237. *Caminetti v. United States*, 242 U.S. 470, 485 (1917) ("[i]t is elementary that the meaning of a statute must, in the first instance, be sought in the language in which the act is framed, and if that is plain... the sole function of the courts is to enforce it according to its terms"); *Satterfield v. Satterfield*, 448 S.W.2d 456, 459 (Tex. 1969) ("Words in common use, when used by the Legislature in a statute, . . . are to be interpreted as intending to express the meaning in which they are ordinarily understood").

238. "Under the rule of ejusdem generis, where specific and particular enumerations of persons or things in a statute are followed by general words, the general words are not to be construed in their widest meaning or extent, but are to be treated as limited and applying only to persons or things of the same kind or class as those expressly mentioned." *Stanford v. Butler*, 142 Tex. 692, 181 S.W.2d 269, 272 (1944). The rule of ejusdem generis gives way to statutory language which discloses a contrary legislative intent. *Carbide Intern., Ltd. v. State*, 695 S.W.2d 653, 658 (Tex. App.--Austin 1985, no writ).

239. Sometimes it is not clear whether a listing in a statute is exhaustive or merely illustrative. Nelson, *supra* n. 226 p. 337; *Maley v. 7111 Southwest Freeway, Inc.*, 843 S.W.2d 229, 231 (Tex. App.--Houston [14th Dist.] 1992, writ denied) ("an express listing of certain persons, things, consequences, or classes is equivalent to an express exclusion of all others").

240. *City of Tacoma, Washington v. FERC*, 331 F.3d 106, 115 (D.C. Cir. 2003).

241. Words of a feather flock together. *Jarecki v. G.D. Searle & Co.*, 367 U.S. 303, 307 (1961) ("a word is known by the company it keeps").

242. The last antecedent rule: *Saade v. Villarreal*, 280 S.W.3d 511, 519 n. 9 (Tex. App.--Houston [14th Dist.] 2009, pet. dism'd) ("generally, a relative or qualifying clause applies only to the immediately preceding words or clause").

243. *West Cameron Port v. Lake Charles Harbor & Terminal*, 38 So.3d 577, 583 n. 2 (La. App. 2010) ("The doctrine holding that general words in a later statute do not repeal an earlier statutory provision dealing with a special subject.")

244. *Big H Auto Auction v. Saenz Motors*, 665 S.W.2d 756, 758 (Tex. 1984).

245. *Duson v. Poage*, 318 S.W.2d 89, 96 (Tex. Civ. App.--Houston 1958, writ ref'd n.r.e.).

246. *Lane v. Ross*, 249 S.W.2d 591, 594 (Tex. 1952).

247. *Bayou Pipeline Corp. v. Railroad Commission*, 568 S.W.2d 122, 125 (Tex. 1978) ("Bayou relies on . . . cases in which courts have construed the word 'and' in a statute to mean 'or.' While there may be circumstances which call for such a construction, ordinarily the words 'and' and 'or' are not interchangeable. ").

248.*NLRB v. Catholic Bishop of Chicago*, 440 U.S. 490, 501 (1979).

249. *Welch v. Welch*, 369 S.W.2d 434, 437 (Tex. Civ. App.--Dallas 1963, no writ).

250. *Quick v. City of Austin*, 7 S.W.3d 109, 132 (Tex. 1998). This canon has both descriptive and normative qualities. Nelson, *supra* n. 226 p. 357.

251. *Jessen Associates, Inc. v. Bullock*, 531 S.W.2d 593, 600 n. 9 (Tex. 1976); *Lenhard v. Butler*, 745 S.W.2d 101, 105 (Tex. App.--Fort Worth 1988, writ denied) (discussing the doctrine of "in para materia" as applied to two or more statutory provisions pertaining to the same subject).

252. *Tex. Dep't. of Public Safety v. Schaejbe*, 687 S.W.2d 727, 728 (Tex. 1985).

253. *LaSara Grain Co. v. First Nat. Bank of Mercedes*, 673 S.W.2d 558, 565 (Tex. 1984).

254. *Maley v. 7111 Southwest Freeway, Inc.*, 843 S.W.2d 229, 231 (Tex. App.--Houston [14th Dist.] 1992, writ denied) ("we will not adopt a construction that would render a law or provision absurd or meaningless").

255. *Harris v. U.S.*, 536 U.S. 545, 555 (2002) ("when 'a statute is susceptible of two constructions, by one of which grave and doubtful constitutional questions arise and by the other of which such questions are avoided, our duty is to adopt the latter"").

256. *Murray v. The Schooner Charming Betsy*, 6 U.S. (2 Cranch) 64, 118, 2 L.Ed. 208 (1804) (Marshall, C.J.) ("an act of Congress ought never to be construed to violate the law of nations if any other possible construction remains, and consequently can never be construed to violate neutral rights, or to affect neutral commerce, further than is warranted by the law of nations as understood in this country") [1804 WL 1103].

257. *Holy Trinity Church v. United States*, 143 U.S. 457 (1892) ("It is a familiar rule, that a thing may be within the letter of the statute and yet not within the statute, because not within its spirit, nor within the intention of its makers").

258. *McNally v. United States*, 483 U.S. 350 (1987).

259. *United States v. Bass*, 404 U.S. 336, 349 (1971) ("[U]nless Congress conveys its purpose clearly, it will not be deemed to have significantly changed the federal-state balance").

260. *Chevron v. Natural Resources Defense Council*, 467 U.S. 837 (1984), which was substantially narrowed in *U.S. v. Mead Corp.*, *United States v. Mead Corp*., 533 U.S. 218, 226-227 (2001).

261. Nelson, *supra* n. 226 p. 329.

262. The list is taken from <http://www.stanford.edu/dept/english/courses/sites/lunsford/pages/defs.htm> (8-5-2010).

263. Jeanne Fahnestock *The Appeals: Ethos, Pathos, and Logos* <http://members.tripod.com/butler_s/f2002-1002/appeals.html> (8-11-2010).

264. Aristotle, RHETORIC <http://grammar.about.com/od/il/g/inventedethos.htm> (8-17-2010).

265. <http://grammar.about.com/od/rs/g/situatedethos.htm> (8-12-2010).

266. Orgren, *supra* n. http://rhetoric.byu.edu/figures/e/enthymeme.htm pp. 4-5.

267. Brian Ogren, *Aristotle's Rhetoric and the Cognition of Being: Human Emotions and the Rational-Irrational Dialectic*, 8 MINERVA 4-5 (2004) <http://www.ul.ie/~philos/vol8/aristotle.html> (8-1--2010).

268. <http://rhetoric.byu.edu/figures/e/enthymeme.htm> (8-12-2010).

269. Zarefsky, *supra* n. 76 Vol. 2 p. 58 (2d ed. The Teaching Company 2005) <http://www.teach12.com>.

270. See Section XII.

271. Zarefsky, *supra* n. 76 vol. 2 p. 58.

272. Douglas Walton and Fabrizio Macagno, *Enthymemes, Argumentation Schemes and Topics*, LOGIQUE & ANALYSE 39, 43 (2009) <http://www.dougwalton.ca/papers%20in%20pdf/09ScmTopEnt.pdf> (8-16-2010).

273. A "maxim" is a short, pithy saying. <http://rhetoric.byu.edu> (8-17-2010).

274. An “adage” is a short, pithy saying, or traditional expression of conventional wisdom. <http://rhetoric.byu.edu> (8-17-2010).

275. “Gnome” is one of several terms describing short, pithy sayings. <http://rhetoric.byu.edu> (8-17-2010).

276. “Paroemia” is one of several terms describing short, pithy sayings. <http://rhetoric.byu.edu> (8-17-2010).

277. “Sententia” is one of several terms describing short, pithy sayings. <http://rhetoric.byu.edu> (8-17-2010).

278. *See Silva Rhetoricae (the Forest of Rhetoric)* <http://rhetoric.byu.edu> (8-17-2010).

279. The song was written by Pete Seeger in 1955, based on a sentence taken from a Ukranian folk song, and was then added to and put into its final shape by Joe Hickerson in 1960. The song was popularized by the Kingston Trio in 1961.

280. Richard Nordquist, *What Is an Analogy?* <http://grammar.about.com/od/rhetoricstyle/f/qanalogy07.htm> (8-9-2010).

281. Richard Nordquist, *Analogy?* <http://grammar.about.com/od/ab/g/analogy.htm> (8-9-2010).

282. Richard Nordquist, *Analogy?* <http://grammar.about.com/od/rs/g/simileterm.htm> (8-9-2010).

283.Tom McArthur, THE OXFORD COMPANION TO THE ENGLISH LANGUAGE (1992).

284. John Stuart Mill, A SYSTEM OF LOGIC Book V, ch. 5 § 7.

285. <http://rhetoric.byu.edu/Figures/E/expeditio.htm> (8-5-2010).

286. <http://rhetoric.byu.edu/figures/P/proecthesis.htm> (8-5-2010).

287. YouTube < http://www.youtube.com/watch?v=jRth45yU_2Q> (8-17-2010).

288.Andrew R. Cline, *Rhetorica: A Rhetorical Primer* (2006) <http://rhetorica.net/textbook/invention.htm> (8-17-2010).

289. *Style* <http://rhetoric.byu.edu/canons/Style.htm> (8-11-2010).

290. *Style* <http://rhetoric.byu.edu/canons/Style.htm> (8-11-2010).

291. *Style* <http://rhetoric.byu.edu/canons/Style.htm> (8-11-2010).

292. *Style: Levels of Style* <http://rhetoric.byu.edu/canons/Style/Style-Levels.htm> (8-11-2010).

293. *Qualities of Style* <http://rhetoric.byu.edu/canons/Style/Style-Qualities.htm> (8-11-2010).

294. *Figures of Speech* <http://rhetoric.byu.edu/Figures/Figures-Overview.htm> (8-11-2010).

295.See Cline, *supra* n.287.

296. <http://www.psych.ucsb.edu/~hegarty/papers/SCCgestures.pdf >(8-17-2010).

297.See Cline, *supra* n. 287.

298.See *Figures of Order* <http://rhetoric.byu.edu/Figures/Groupings/of%20order.htm> (8-17-2010).

299. Snopes <http://www.snopes.co25, 2008) m/language/mistakes/noprice.asp> (8-12-2010).

300.Laurence Tribe, *The Invisible Constitution*, Ford Hall Forum (September 25, 2008) <http://fora.tv/2008/09/25/Laurence_H_Tribe_The_Invisible_Constitution#chapter_03 > (8-1-2010). The incident is detailed in James J. Kirschke, GOUVERNEUR MORRIS: AUTHOR, STATESMAN, AND MAN OF THE WORLD 169 (2005).

301.Richard Brookhiser, GENTLEMAN REVOLUTIONARY: GOUVERNEUR MORRIS, THE RAKE WHO WROTE THE CONSTITUTION 90 (2003).

302. Strunk & White, ELEMENTS OF STYLE 7 (3d ed. 1979).

303. Copperud, AMERICAN USAGE AND STYLE: THE CONSENSUS 188 (1980).

304. Strunk & White, ELEMENTS OF STYLE 9 (3d ed. 1979).

305. *See* <http://changingminds.org/techniques/language/modifying_meaning/emphasis_writing.htm> (8-17-2010).

306. "Italic is sometimes used to differentiate or to give greater prominence to words, phrases, etc. However, an excessive amount of italic defeats this purpose and should be restricted." U.S. Government Printing Office Style Manual § 11.1 (2008) <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2008_style_manual&docid=f:chapter11.wais> (8-17-2010).

307. Edward D. Johnson, THE HANDBOOK OF GOOD ENGLISH 249-50 (1982) ["Johnson"].

308. <http://www.nytimes.com/2009/06/28/magazine/28FOB-onlanguage-t.html> (8-17-2010).

309. "There are many people in the world who really don't understand, or say they don't, what is the great issue between the free world and the Communist world. / Let them come to Berlin. / There are some who say -- There are some who say that communism is the wave of the future. / Let them come to Berlin. / And there are some who say, in Europe and elsewhere, we can work with the Communists. / Let them come to Berlin. / And there are even a few who say that it is true that communism is an evil system, but it permits us to make economic progress. / Lass' sie nach Berlin kommen. / Let them come to Berlin. . . ." <http://www.americanrhetoric.com/speeches/jfkberliner.html> (8-17-2010).

310. Personal pronouns are: I, we, you, thou, he, she, it, they.

311. Demonstrative pronouns are: this, these, that, and those. See René Magritte's painting *The Treachery of Images* (1928-29), which is a drawing of a pipe with the phrase in French: "This is not a pipe." If "this" means the image depicted, then the painting if false. If "this" means the painting, then the statement is true.

312. Relative pronouns are: who, which, that, as.

313. Indefinite pronouns include: each, all, everyone, either, one, both, any, such, somebody.

314. Interrogative pronouns are: who, which, what.

315. Possession pronouns are: my, your, his, her, our, their.

316. Reflexive pronouns are: myself, himself, herself, and itself.

317. Bryan A. Garner, *Judges on Effective Writing: The Importance of Plain Language*, MICHIGAN B. J. (Feb. 2005) http://www.michbar.org/journal/pdf/pdf4article845.pdf (8-17-2010).

318. *See* e.g., NLRB STYLE MANUAL 51-66 (2000) <http://www.nlrb.gov/nlrb/legal/manuals/stylemanual.pdf> (8-17-2010).

319. Richard Nordquist, *Top 20 Figures of Speech* <http://grammar.about.com/od/rhetoricstyle/a/20figures.htm> (7/28/2010); *Figure of Speech*, Wikipedia <http://en.wikipedia.org/wiki/Figure_of_speech> (on 7/28/2010).

320. H. Porter Abbott, THE CAMBRIDGE INTRODUCTION TO NARRATIVE 3 (2d ed. 2002).

321. James Phelan, NARRATIVE AS RHETORIC: TECHNIQUE, AUDIENCES, ETHICS, IDEOLOGY 219 (1996) <http://www.ohiostatepress.org/books/complete%20pdfs/phelan%20narrative/14.pdf> (8-9-2010).

322. Abbott, *supra* n. 319 p. 4.

323. *Id.* at 219.

324. Maggie Bruck and Stephen J. Ceci, *The Suggestibility of Children's Memory,* 50 ANNU. REV. PSYCHOL. 419, 421 (1999) <http://www.arts.uwaterloo.ca/~doneill/cogsci600/Kenyon.pdf > (8-17-2010).

325. <http://www.youtube.com/watch?v=FbIX1CP9qr4> (8-12-2010).

326. <http://www.fff.org/comment/com0311c.asp> (8-12-2010).

327.E. F. Loftus, EYEWITNESS TESTIMONY (1996). Elizabeth F. Loftus, *Leading Questions and the Eyewitness Report*, 7 COGNITIVE PSYCHOLOGY 550 (1975) (to locate Dr. Loftus' seminal article, go to Google's search page and search for "Leading Questions and the Eyewitness Report").

328. *Caperton v. A.T. Massey Coal Co.*, 556 U.S. ----, ----, 129 S.Ct. 2252, 2261, 2269-2272 (2009) (Roberts, C. J., dissenting).

329. <http://www.uottawa.ca/academic/arts/writcent/hypergrammar/usetense.html> (8-15-2010).

330. <http://www.bartleby.com/141/strunk5.html> (8-12-2010).

331. Phillip Sipiora, *Introduction: the Ancient Concept of Kairos* http://www.sunypress.edu/pdf/60473.pdf (8-17-2010), FROM RHETORIC AND KAIROS : ESSAYS IN HISTORY, THEORY, AND PRAXIS, Phillip Sipiora and James S. Baumlin, editors.

332. Carl Glover, *Kairos and Composition: Modern Perspectives on an Ancient Idea*, (dissertation), quoted in Steven D. Krause, *The Immediacy of Rhetoric: Definitions, Illustrations, and Implications*, ch. 1 (dissertation) <http://www.emunix.emich.edu/~krause/Diss/> (8-17-2010).

333.Mercier, *supra* n. 160 p. 15.

334. According to the Greek historian Heroditus, ch. 1.91, Lydian King Croesus, sent extravagant gifts to the Oracle at Delphi, inquiring whether he should attack Cyrus the Great, founder of the Persian Empire. The Oracle responded that "if he attacked the Persians, he would destroy a mighty empire." Croesus initiated the attack, was defeated and enslaved, but blamed his decision to attack on the Oracle. Cyrus sent to Delphi for an explanation, and the Oracle said: "he ought, if he had been wise, to have sent again and inquired which empire was meant, that of Cyrus or his own; but if he neither understood what was said, nor took the trouble to seek for enlightenment, he has only himself to blame for the result." <http://www.iranchamber.com/history/herodotus/herodotus_history_book1.php> (8-17-2010).

335. *See* <http://www.huffingtonpost.com/2010/06/09/kevin-costner-testifies-b_n_606542.html> (8-17-2010).

336. "In June, 2002, Senator George Voinovich (R – Ohio) refused to attend the Senate's Environment and Public Works Clean Air Subcommittee hearing to protest the appearance of Kevin Richardson, member of the pop music group, the Backstreet Boys. According to Voinovich, 'It's just a joke to think that this witness can provide members of the United States Senate with information on important geological and water quality issues. We're either serious about the issues or we are running a sideshow.'"(Rulon 2002, 1). Harry C. Strine IV, "Your Testimony Was Splendid: The Treatment of Celebrities and Non-Celebrities in Congressional Hearings," <http://www.allacademic.com//meta/p_mla_apa_research_citation/0/9/3/7/8/pages93788/p93788-2.php> (8-17-2010).

337. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

338. *Burrow v. Arce*, 997 S.W.2d 229, 235 (Tex. 1999).

339. <http://www.nizkor.org/features/fallacies/appeal-to-fear.html> (8-12-2010).

340. <http://www.nizkor.org/features/fallacies/appeal-to-flattery.html> (8-12-2010).

341. <http://www.nizkor.org/features/fallacies/appeal-to-novelty.html> (8-12-2010).

342. <http://www.nizkor.org/features/fallacies/appeal-to-pity.html> (8-12-2010).

343. <http://www.nizkor.org/features/fallacies/appeal-to-ridicule.html> (8-12-2010).

344. <http://www.nizkor.org/features/fallacies/appeal-to-tradition.html> (8-12-2010).

345. <http://www.nizkor.org/features/fallacies/ad-hominem-tu-quoque.html> (8-12-2010).

346. <http://philosophy.lander.edu/logic/appendb.html> (8-12-2010).

347. Mercier, *supra* n. 160 p. 15.

348. Mercier, *supra* n. 160 p. 15

349. <http://www.nizkor.org/features/fallacies/middle-ground.html> (8-17-2010).

350.Hillary Clinton said, on September 13, 2001: "Every nation has to either be with us, or against us. Those who harbor terrorists, or who finance them, are going to pay a price." < http://www.youtube.com/watch?v=DbYGYiGjpUs> (8-17-2010).

351.In his address on September 13, 2001to a joint session of congress, President George W. Bush said: "Either you are with us, or you are with the terrorists."

352. <http://www.nizkor.org/features/fallacies/genetic-fallacy.html> (8-12-2010).

353. <http://www.nizkor.org/features/fallacies/burden-of-proof.html> (8-12-2010).

354. <http://www.nizkor.org/features/fallacies/misleading-vividness.html> (8-12-2010).

355. Antony Flew, THINKING ABOUT THINKING (1975).

356. <http://www.nizkor.org/features/fallacies/confusing-cause-and-effect.html> (8-12-2010).

357. <http://www.nizkor.org/features/fallacies/post-hoc.html> (8-12-2010).

358. Hausman, Alan, Howard Kahane, and Paul Tidman, *Logic and Philosophy: A Modern Introduction* 357 (2007), quoted in Brian Lightbody and Michael Berman, *The Metaphoric Fallacy to a Deductive Inference*, 30 INFORMAL LOGIC 185, 189 (2010) <http://www.phaenex.uwindsor.ca/ojs/leddy/index.php/informal_logic/article/download/1192/2410> (8-6-2010).

359. Internet Encyclopedia of Philosophy <http://www.iep.utm.edu/fallacy> (8-7-2010).

360. "Figures of speech" in this context related to ambiguity arising when Greek words had different cases or genders that were spelled the same way. We don't have that problem in English.

361. John Stuart Mill, A SYSTEM OF LOGIC Book 5, ch. 2, § 1 (1843) <http://oll.libertyfund.org/title/247/40031> (8-12-2010).

362. John Stuart Mill, A SYSTEM OF LOGIC Book 5, ch. 3, § 1 (1843) <http://oll.libertyfund.org/title/247/40031> (8-12-2010).

363. John Stuart Mill, A SYSTEM OF LOGIC Book 5, ch. 3, § 2 (1843) <http://oll.libertyfund.org/title/247/40031> (8-12-2010).

364. John Stuart Mill, A SYSTEM OF LOGIC Book 5, ch. 5 (1843) <http://oll.libertyfund.org/title/247/40041> (8-12-2010).

365. John Stuart Mill, A SYSTEM OF LOGIC Book 5, ch. 6 (1843) <http://oll.libertyfund.org/title/247/40041> (8-12-2010).

366. John Stuart Mill, A SYSTEM OF LOGIC Book 5, ch. 7 (1843) <http://oll.libertyfund.org/title/247/40041> (8-12-2010).

367. Nolt, *supra* n. 135 ch. 8.

368. Nolt, *supra* n. 135 ch. 8.

369. Toulmin's invention of warrants has been described as "the most important contribution since Aristotle distinguished premises from conclusions." David Hitchcock, *Johnson's "Rise of Informal Logic"*, 18 INFORMAL LOGIC 273, 275 (1996). <http://ojs.uwindsor.ca/ojs/leddy/index.php/informal_logic/article/download/2385/1827> (8-6-2010).

370. Walton, *supra* n. 271 p. 45.

371. *Id*. at 3.

372. *Id*. at 4-5.

373. *Id.* at 39.

374. *Id.* at 39.

375. *Id.* at 41.

376. *Id.* at 41.

377. *Id.* at 42.

378. A "colorable claim for relief" is a claim that, on appropriate proof, would support a recovery in a bankruptcy context. *In re STN Enterprises*, 779 F.2d 901, 904 (2d Cir.1985). For example, the examiner appointed by the court to conduct an investigation into the Lehman Brothers bankruptcy found that colorable claims existed against high management and against Lehman's auditors, Ernst and Whinney. See <http://lehmanreport.jenner.com/VOLUME%201.pdf> (8-3-2010).

379. DSM-IV-TR p. xxxi (2000).

380. http://www.brainyquote.com/quotes/quotes/a/alberteins100201.html (8-18-2010).

381. Jeremy Waldron, *Vagueness in Law and Language: Some Philosophical Issues*, 82 CAL. L. REV. 509, 517 (1994).

382. *See e.g.*, Jonathan St. B. T. Evans, The heuristic-analytic theory of reasoning: Extension and evaluation, 13 PSYCHONOMIC BULLETIN & REVIEW 378 (2006) <http://pbr.psychonomic-journals.org/content/13/3/378.full.pdf> (8-18-2010) (suggesting that heuristic-analytic reasoning is the basic mode of thought, that is sometimes assisted or supplanted by logical thinking.)

383. Hal R. Arkes, *Impediments to Accurate Clinical Judgment*, 49 JOURNAL OF COUNSELING & CLINICAL PSYCHOLOGY 323 (1981), citing M. Snyder, *Seek and Ye Shall Find . . .*, in E.T. Higgins, C.P. Herman, & M.P. Zanna (eds.) SOCIAL COGNITION: THE ONTARIO SYMPOSIUM ON PERSONALITY AND SOCIAL PSYCHOLOGY (1981).

384. Howard N. Garb, STUDYING THE CLINICIAN 183 (1998).

385. Abraham Lincoln, circa 1850. The expanded quotation is: "Extemporaneous speaking should be practiced and cultivated. It is the lawyer's avenue to the public. However able and faithful he may be in other respects, people are slow to bring him business, if he cannot make a speech. And yet there is not a more fatal error to young lawyers, than relying too much on speech making. If any one, upon his rare powers of speaking, shall claim exemption from the drudgery of the law, his case is a failure in advance." <http://showcase.netins.net/web/creative/lincoln/speeches/lawlect.htm> (7-29-2010).

386. Abraham Lincoln, quoted in *The Independent* for September 1, 1864, cited at <http://www.math.lsu.edu/~madden/M4005s2006/geometry1.pdf> (7-29-2010).

387. Osman, *supra* n. 6 p. 1001.

388. *Kyllo v. U.S.*, 533 U.S. 27 (2001).

389. The TSA website has posted sample images. <http://www.tsa.gov/blog/uploaded_images/untitled-717391.JPG> (8-16-2010).

390. <http://www.sonofthesouth.net/slavery/abraham-lincoln/abraham-lincoln-cooper-union-speech.htm>.

391. Abraham Lincoln, Debate with Douglas, Columbus, Ohio, Sept. 1859.

392. Nuremberg Principle IV provided: "The fact that a person acted pursuant to order of his Government or of a superior does not relieve him from responsibility under international law, provided a moral choice was in fact possible to him." <http://www.icrc.org/ihl.nsf/full/390> (8-17-2010).

393. Madison died on the day of the 50th anniversary of the signing of the Declaration of Independence, as did John Adams. The tribulations of reassembling and preserving Madison's entire body of writing is detailed at <http://memory.loc.gov/ammem/collections/madison_papers/mjmabout2.html> (8-17-2010).

394. John Stuart Mill, 8 A SYSTEM OF LOGIC RATIONCINATION AND INDUCTIVE, Beck V, Ch. 3 § 1 (1843) <http://oll.libertyfund.org/index.php?option=com_staticxt&staticfile=show.php%3Ftitle=247&layout=html#chapter_40033> (8-17-2010

395. Hélène Landemore, *Majority Rule and the Wisdom of Crowds: the Task-Specificity of Majority Rule as a Predictive Tool* <www.sas.upenn.edu/ppe/documents/MajorityRule_Landemore.pdf> (8-5-2010).

396. Johnny Cochran's closing argument in the O.J. Simpson case <http://www.youtube.com/watch?v=jRth45yU_2Q&NR=1> (8-17-2010).

397. *Taylor v. State*, 671 S.W.2d 535, 538 (Tex. App.--Houston [1st Dist.] 1983, no writ).

398. *Universe Life Ins. Co. v. Giles*, 950 S.W.2d 48, 71 (Tex. 1997).

399. *Read v. Scott Fetzer Co.*, 990 S.W.2d 732, 736 (Tex. 1998).

400. *In re M.C.F.*, 121 S.W.3d 891, 896 (Tex. App.--Fort Worth 2003, no pet.).

401. This preference for the simple explanation over the more complex is known as the Rule of Parsimony, or Occam's Razor.

402. Austin Cline, *Lexical Definitions* <http://atheism.about.com/od/logicalarguments/a/def_lexical.htm> (8-9-2010).

403. Austin Cline, *Stipulative Definitions* <http://atheism.about.com/od/logicalarguments/a/def_stipulative.htm> (8-9-2010).

404. Austin Cline, *Persuasive Definitions* <http://atheism.about.com/od/logicalarguments/a/def_persuasive.htm> (8-9-2010).

405. Austin Cline, *Precising Definitions* <http://atheism.about.com/od/logicalarguments/a/def_precising.htm> (8-9-2010).

406. Austin Cline, *Theoretical Definitions* <http://atheism.about.com/od/logicalarguments/a/def_theoretical.htm> (8-9-2010).

407. <http://www.youtube.com/watch?v=jRth45yU_2Q&NR=1> (8-17-2010).

408. Richard Crawley translation (1874).

409. *Reductio ad Absurdum*, Internet Encyclopedia of Philosophy <http://www.iep.utm.edu/reductio/#H1> (8-15-2010).

410. This type of question had been anticipated, and an answer rehearsed, but Dukakis didn't give the rehearsed answer. See <http://archive.newsmax.com/archives/articles/2004/9/27/103737.shtml> (8-12-2010).

411. *Katz v. United States*, 389 U.S. 347, 351 (1967).

412. Mercier, *supra* n. 135 p. 16.

413. Nolt, *supra* n. 135 p. 206.

414. Nolt, *supra* n. 135 p. 207.

415.<www.iép.utm.edu/prop-log>4 p. 10 (8-17-2010).

416. Norman Malcolm, *The Nature of Entailment*, 49 MIND 333 (1940) <http://www.jstor.org/pss/2250488> (8-14-2010).

417. *Defeasible Reasoning*, Stanford Encyclopedia of Philosophy <http://plato.stanford.edu/entries/reasoning-defeasible> (8-15-2010).