

Postgraduate Diploma in IT Forensics

Week 2 of Module 5: Collecting Digital Evidence & Presentation in Court

Hayson Tse, PhD (HK), Adjunct Lecturer, HKUSPACE

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Contents

1 Prologue	2
1.1 Help	2
1.2 Contact info	2
1.3 Copyright	3
1.4 Disclaimer	3
1.5 Classroom regulations	3
1.6 Important dates	3
1.7 Overview of your work cycle	4
2 Investigative interviewing	4
2.1 The Art of Investigative Interviewing	4
2.2 Chapter 1 So You Want to Be an Investigative Interviewer?	4
2.3 Chapter 2 Ethical standards and professionalism	5
2.4 Examples of code of conduct	5
2.5 Unethical interviewing	6
2.6 Conflict of interest	6
3 Background to analysis of evidence	6
3.1 Model	6
3.2 Meaning of “forensic”	7
3.3 Your work	8
3.4 Private & public Prosecution	9
3.5 Litigation process	9
3.6 Investigators v. click button operators	9
3.7 Courts and tribunal of facts	9
4 Reasoning with Evidence	9
4.1 Reasoning	9
4.2 Law of evidence	10
4.3 Science of proof	10

4.4	Types of sources:	10
4.5	John Henry Wigmore (1863 - 1943) & thereafter	10
4.6	Methods of Science of Proof	10
4.7	Source of evidence, evidential data	11
4.8	Generalization	11
4.9	Process of proof	11
4.10	Features of witness testimony	12
4.11	Proof of criminal intent by circumstantial evidence	12
4.12	Proof that an event did not happen by circumstantial evidence	12
5	Introduction to law of evidence	13
5.1	Murphy on Evidence	13
5.2	What is evidence	13
5.3	Principal characteristics of judicial trials	14
5.4	Evaluations of standards and burdens of proof	15
5.5	Phipson on Evidence	15
5.6	Classification of evidence	16
5.7	Meaning of terms	16
5.8	Challenges to evidence	18
6	Analysis of evidence	19
6.1	Analysis of evidence	19
6.2	Techniques of analysis (Chapter 1)	20
6.3	Gathering of evidence (Chapter 2)	21
6.4	Three types of logical reasoning and justification	21
6.5	Basis for a testimonial assertion	23
6.6	Analysis (Chapter 4)	23
6.7	Methods	23
6.8	Protocol for analysis	24
6.9	An example	27
6.10	Symbols and uses	30
6.11	Advantage	35
7	Epilogue	35
7.1	Summary	35

1 Prologue

1.1 Help

- Blue means I am a link; please click me.

1.2 Contact info

- Personal email

1.3 Copyright

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1.4 Disclaimer

- All materials come from the public domain. There are no government or trade secrets.
- Newspaper clippings may or may not contain the complete sets of allegations in relation to a case.
- A person who has been reported by newspaper clippings as being arrested or charged is presumed innocent until he is convicted or even until his appeal against conviction is dismissed.

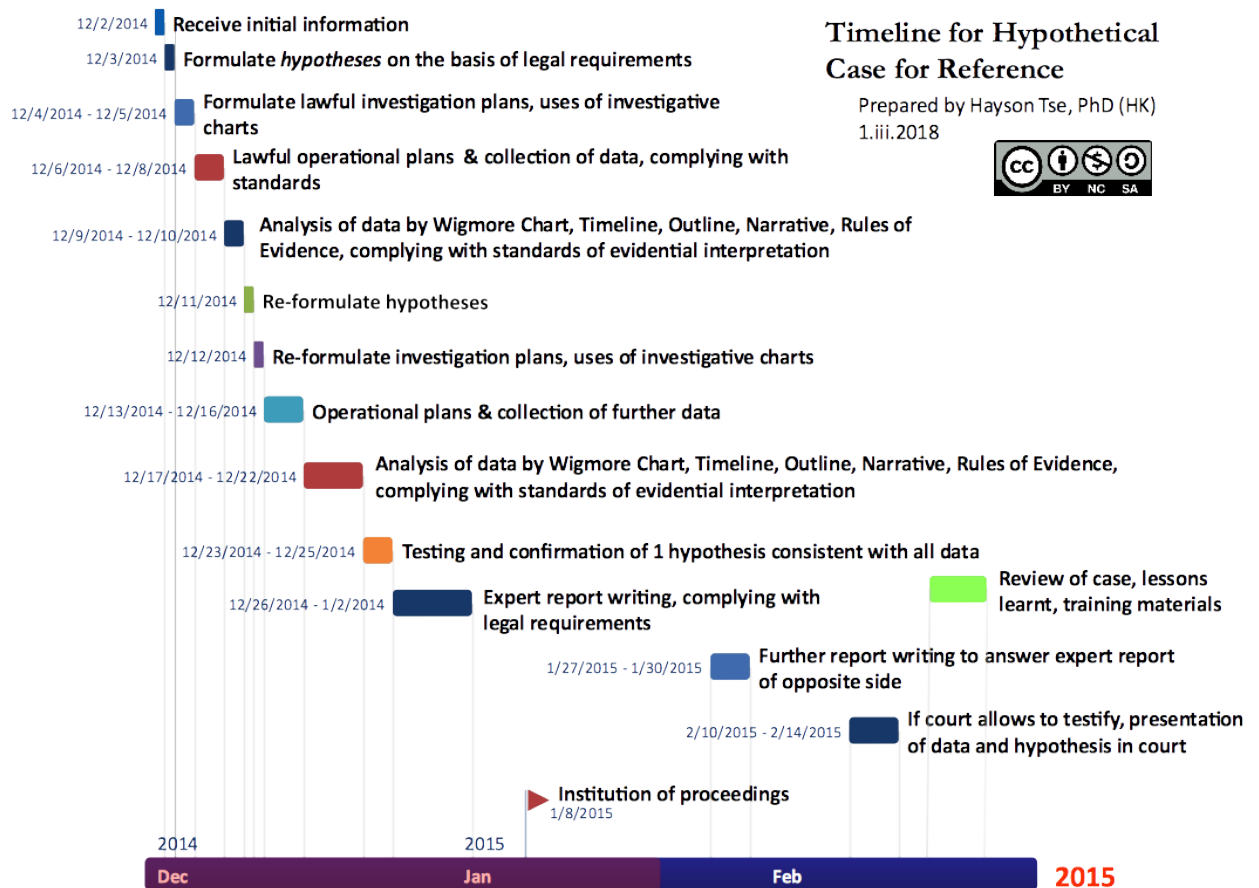
1.5 Classroom regulations

- [HKU SPACE Handbook](#)
- No reservation of seats.
- No eating or drinking.
- Turn off all mobile phones and pagers.
- No smoking at all HKU SPACE learning centres and the University campus.
- *No video / audio recording, unless with the permission of the Programme Director / Manager*
- The Programme Direction / Manager may impose any conditions when granting the permission.
- No unattended personal belongings.

1.6 Important dates

- Assignment: 2 May 2019
- EXAMINATION: 1 June 2019

1.7 Overview of your work cycle



2 Investigative interviewing

2.1 The Art of Investigative Interviewing

- Inge Sebyan Black & Charles L. Yeschke. The Art of Investigative Interviewing, 3rd Edition. Elsevier, 2014.

“The investigative interview is an art because each of us makes it such. Each of you will bring your own style, technique, and personality to each of your interviews.”

2.2 Chapter 1 So You Want to Be an Investigative Interviewer?

- Generally speaking, investigators will find the following qualifications in demand by employers:
 - Communication skills, both written and verbal

- Intelligence — the ability to see the entire picture; not stuck in tunnel vision; insightfulness
- Persistence – having drive; how badly do you want to know the truth, and will you put in the work?
- Training – have you had training and in what specific areas?
- Perseverance
- Patience — needed because time is necessary to uncover the truth and get the results you want
- Attention to detail — even to the slightest bits of evidence or items that may be overlooked; thoroughness
- Curiosity – a need to know
- Sensitivity – empathy; respect for yourself and others
- Ethical – being honest and having the courage to uncover truth despite obstacles

2.3 Chapter 2 Ethical standards and professionalism

- Common elements within a code of ethics are:
 - Work in accordance to any local, state, provincial, or government laws
 - Work within company policies, if this applies
 - Be honest and impartial
 - Remain objective
 - Maintain the highest standard of morals and ethics
 - Have and maintain integrity
 - Provide truthful and accurate reports
 - Respect the inherent dignity of all people
 - Be diligent
 - Be ethical in soliciting business
 - Never disclose confidential information
 - Never knowingly cause harm
 - Accept no illegal or improper remuneration for services rendered
 - Refrain from representing competing or conflicting interests or the perception of conflicting interests
 - Support the purposes and objectives of the profession
 - Refrain from negative comment about other interviewers
- Why are ethical standards so critical for investigative interviewers?
 - Values define who you are
 - Ethics come into play when external pressures push someone to act in a manner that is not consistent with his or her values
 - A code of ethics provides a commonly held set of guidelines that will provide a consistent, value-driven basis for judging what is right or wrong in any given situation and establishes the outer limits of acceptable behavior.

2.4 Examples of code of conduct

- [Code of Ethical Conduct](#) for the Security Professionals Australasia

2.5 Unethical interviewing

- Behaviours that are considered unethical during interviewing:
 - Using interrogation tactics instead of interviewing tactics
 - Treating each interviewee as though culpable, with little or no regard for the destructive public relations and psychological damage inflicted on interviewees who are blameless
 - Making threats
 - Making illegal promises
 - Using coercion
 - Using duress
 - Using force or the threat of force
 - Employing ruthless methods
 - Falsely imprisoning the interviewee
 - Not respecting the interviewee
 - Not maintaining the interviewee's dignity

2.6 Conflict of interest

- Questions to ask to avoid a conflict of interest
 - Do you have a personal relationship with the person you will be interviewing or another person who has an interest in the case?
 - Do you have any financial relationship with the person you will be interviewing?
 - Is this case somehow related to another organization you are working with?
 - Do you have a professional relationship to another person or organization that is associated in any way to the case you are working on?
 - Do you have any personal or professional bias that would make others question your ability to handle this case fairly and ethically?
 - Would you personally benefit in any way from conducting interviews for this case?
 - Have you had any direct knowledge of policies or practices that would affect the interviews you are about to do?
 - Have you already formed an opinion on this case?

3 Background to analysis of evidence

3.1 Model

- Computer Forensic Examination & Analysis Model and Flow Diagram
 - Attack and defence: investigation process is like Kungfu

Working environment (工作环境)	Legal Bases (法律依据)	Supervision of Chain of Exhibits (证据链的监督)
	Forensic Examination Requirements (鉴定要求)	
	Collection of examination Targets and Cloning (检材接收与克隆)	
	Formulate Forensic Examination Plan (制定鉴定方案)	
	Time Analysis, Space Analysis, Structure Analysis, Module Analysis (时间分析, 空间分析, 结构分析, 粒度分析)	
	Function Analysis, Relation Analysis, Data Analysis, Codes Analysis (功能分析, 相关分析, 数据分析, 代码分析)	
	Forensic Examination Conclusion (鉴定结论)	
	Court Appearance (出庭)	
	Legal Qualifications of Personnel and Institution (人员和机构的法律资质)	

Computer Forensic Examination and Analysis Model and Flow Diagram
(计算机取证与分析鉴定的模型和流程)
Digital Evidence Examination Key Laboratory, Hubei University of Police
(湖北警官学院电子取证重点实验室)

3.2 Meaning of “forensic”

- What do the words mean?
 - Forensic
 - Ecosystem
 - Artefacts
- Environmental forensic

“Environmental forensic is defined as the systematic and scientific evaluation of physical, chemical and historical information developing defensible scientific and legal conclusions regarding the source or age of a contaminant release into the environment.” - Morrison, et. al., *Introduction to Environmental forensic, Encyclopaedia of Life Support System*

- Soil forensic

“Forensic soil science is the science or study of soil that involves the application of soil science, especially studies that involve soil morphology, soil mapping (assisted by existing soil maps and spatially held soil data), mineralogy, chemistry, geophysics, biology, and molecular biology to answer legal questions, problems, or hypotheses.” - Fitzpatrick, *Soil: Forensic Analysis, Wiley Encyclopaedia of Forensic Science, pages 2377 - 2388.*

- Forensic Science
 - What is science? See [Richard Feynman's explanation](#).
 - The National Academy of Sciences (2008)

“The use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process.”

- Stephen Jay Gould (1997)

“The net of science covers the empirical universe: what is it made of (fact) and why does it work this way (theory).”

- The US Supreme Court (1993) in *Daubert v. Merrell* 509 U.S. 579 (1993)

“Science is not an encyclopedic body of knowledge about the universe. Instead, it represents a process for proposing and refining theoretical explanations about the world that are subject to further testing and refinement. But, in order to qualify as ‘scientific knowledge,’ an inference or assertion must be derived by the scientific method. Proposed testimony must be supported by appropriate validation — i.e., ‘good grounds,’ based on what is known. In short, the requirement that an expert’s testimony pertain to ‘scientific knowledge’ establishes a standard of evidentiary reliability.”

- The word “forensic” is derived from the Latin word “forum” meaning “public.”

“forensic science”: the profession which answers scientific questions for the courts.

- When some used the word “forensic”, do they mean a difference between computer examiner and computer forensic examiner, digital investigator and digital forensic investigator, traffic accident investigator and traffic accident forensic investigator?

3.3 Your work

- Likelihood to result in litigation
 - Investigators of law enforcement agency or government regulator
 - Investigators of private sector
 - Civil wrongs
 - Criminal offence
 - Claims from employer
 - Summarily dismissal
 - Digital disclosure (discovery)

3.4 Private & public Prosecution

- For an example of private prosecution of a criminal offence, see: [Edko Films Limited v. Elite DVD Shop Limited](#), HCMA 613/2004. (graphical image removed!)

Factors for consideration	Private prosecution
1. Control over proceedings	Advantage
2. Investigatory powers	Disadvantage
3. Code of Practice for Public Prosecutors	Disadvantage
4. Legal professional privilege	Disadvantage
5. Intervene by Public Prosecutor	Disadvantage
6. Unused materials in the hands of law enforcement agencies	Disadvantage

3.5 Litigation process

- [Sun Tzu](#): "The good fighters of old first put themselves beyond the possibility of defeat, and then waited for an opportunity of defeating the enemy."
- [Sun Tzu](#): "To secure ourselves against defeat lies in our own hands, but the opportunity of defeating the enemy is provided by the enemy himself."
- (graphical image removed!)

3.6 Investigators v. click button operators

- SANS Investigation Forensic Toolkit (SIFT) Workstation and REMnux - SANS Institute - download at [here](#) and [further instructions](#)
- (graphical image removed!)

3.7 Courts and tribunal of facts

- Summary trials
 - Magistrates Courts: a magistrate sits alone
 - District Courts: a District Judge sits alone
- Trial on indictment:
 - Court of First Instance of the High Court: a judge of the Court of First Instance of the High Court and a jury

4 Reasoning with Evidence

4.1 Reasoning

- Reasoning is interaction of:
 - Law of evidence
 - Reasoning with rules of law

- Science of proof
- Common sense reasoning about the facts of the case

4.2 Law of evidence

- Rules that determine what evidence may be used (relevancy)
- Admissibility
 - Hearsay is not admissible

4.3 Science of proof

- Sources of evidence
- Common sense reasoning about the facts using sources of evidence and common sense rules. (Generalizations on how the world usually works. A witness sometimes speaks the truth.)

4.4 Types of sources:

- Witness testimony
- Documents
- Generalizations on how the world usually works

4.5 John Henry Wigmore (1863 - 1943) & thereafter

- Mass of evidence v. fact to be proved (determine the effect of a mass of evidence on a probandum, a fact that is to be proved)
- Structure and visualise (a way to structure and visualize this mass of evidence and the corresponding inferences)
 - Determine the effect of a mass of evidence on a probandum, a fact that is to be proved
- A way to structure and visualize this mass of evidence and the corresponding inferences
- Chart Method: Inference charts from evidence to probanda
- Compared with Narrative Method: Stories about the facts
- After Wigmore
 - Science of Proof was neglected
 - Science of proof becomes Evidence Theory
 - Revival of the Science of Proof in about 1980's
 - New Evidence Theorists: Anderson, Schum, Tillers, Twining

4.6 Methods of Science of Proof

- Modified Wigmorean Analysis
- Simpler charts
- Combine charts with outlines, narratives, lists

- Use computer sense-making systems to order, structure and visualize evidence and inference
- Use other techniques to determine effect of mass of evidence on probandum
- Bayesian Probability Calculations
- A combination of the above

4.7 Source of evidence, evidential data

- Witness testimonies, documents, physical objects
- One explanation: No such thing as direct evidence because the data itself is not the fact (accepted inference from the data is the fact)
- Witness statement that “I saw John in Beijing” is not the same as the fact “John was in Beijing”
- When presented with a bloody knife, we only know that “there is a bloody knife”

4.8 Generalization

- Statements of how the world works, for example:
 - General knowledge : witnesses under oath usually speak the truth
 - Common sense: The impact of a hammer can break a person’s skull
- Exceptions (usually, sometimes)
- Process of proof
 - Discovering, testing, justifying hypotheses
 - Best hypothesis justified correctly

4.9 Process of proof

- An example

“Discovering, testing and justifying hypotheses about what happened in a case. The process is “looped” until the best hypothesis can be justified correctly. The police find a dead body (observation). They think that the person has committed suicide (hypothesis 1). They look for evidence supporting this: suicide note, family members’ testimonies, indications of financial or personal problems (pursuit 1). No such evidence is found. Police think that the person’s business partner has killed him (hypothesis 2). They find some evidence supporting this: the dead person wanted to keep the business for himself (pursuit 2). However, they cannot fully justify this: the business partner has an alibi (justification 2). Police think that the person’s lover has killed him (hypothesis 3). They find evidence supporting this: the dead person had multiple lovers (pursuit 3). After some time, they find the perpetrator: the victim’s lover who admits to killing him out of jealousy.” (still trying to find out the source of this citation)

4.10 Features of witness testimony

- veracity: whether the witness himself believes what he says, that is, whether he is biased or lying
- objectivity: whether the witness correctly remembers what he observed
- observational sensitivity: whether the witness correctly observed what happened
- consistent with other witnesses

4.11 Proof of criminal intent by circumstantial evidence

- Section 65A of the Criminal Procedure Ordinance (Chapter 221)

“(1) A court or jury, in determining whether a person has committed an offence –”

“(a) shall not be bound in law to infer that he intended or foresaw a result of his acts or omissions by reason only of its being a natural and probable consequence of those acts or omissions; but”

“(b) shall decide whether he did intend or foresee that result *by reference to all the evidence, drawing such inferences* from the evidence as appear proper in the circumstances.”

4.12 Proof that an event did not happen by circumstantial evidence

- Section 17A of the Evidence Ordinance (Chapter 8)

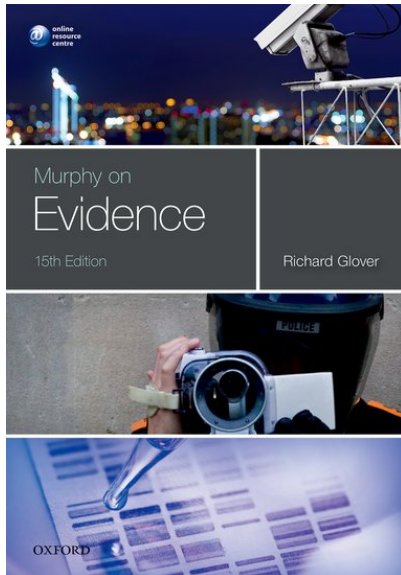
“(1) Where in any criminal proceedings the happening of an event of any description is relevant, and it is proved that a system has been followed whereby a person acting under a duty has compiled a record of the happening of all events of that description, evidence that there is no record of the happening of the event in question shall be admitted as prima facie evidence to prove that the event did not happen.”

“(2) This section shall not apply to any record compiled in connexion with any criminal proceedings or with any investigation relating or leading to any criminal proceedings.”

5 Introduction to law of evidence

5.1 Murphy on Evidence

- Ricard Glover. Murphy on Evidence, 14th Edition. Oxford University Press. Chapter 1. Introduction to the Law of Evidence.



5.2 What is evidence

“Most lawyers and students think of evidence as a collection of rules governing what facts may be proved in court, what materials may be placed before the court to prove those facts, and the form in which those materials should be placed before the court. What they have in mind is the law of evidence, but not evidence itself. One of the curiosities of the common law is the emergence of rules of evidence whose purpose is not to enable a party to bring before the court evidence which might help his case, but to prohibit a party from bringing some kinds of evidence if his opponent objects, or even if the court itself refuses to permit it.” (Murphy)

“...there is a whole field of inquiry which relates to evidence itself, rather than the law of evidence. The field is a fascinating mixture of logic, epistemology, sociology, psychology, and the forensic sciences, and is, therefore, wide enough to encompass a vast library of its own. Its concern is the use of evidence as material in the reconstruction of past events.” (Murphy)

“...John Henry Wigmore, the dean of American evidence writers, required his students to master the science of evidence before turning to law (a luxury now foreclosed by the tyranny of practice-based syllabi and examinations) and developed a thorough, though cumbersome system for the methodical analysis of evidence

to be presented in court.” (Murphy)

“Evidence may be defined in general terms as any material which has potential to change the state of a fact-finder’s belief with respect to any factual proposition which is to be decided and which is in dispute. In more formal terms, Achinstein defines evidence as follows: evidence E is potential evidence on hypothesis H if and only if (1) E is true; (2) E does not make H necessary; (3) the probability of H on E is substantial; and (4) the probability of an explanatory connection between H and E is substantial.” (Murphy)

5.3 Principal characteristics of judicial trials

- 5 characteristics of a judicial trial, which distinguish that process from historical and other inquiries
 - Issues defined narrowly
 - Time limit
 - Adversarial contests
 - Evaluations of standards and burdens of proof
 - Jury

5.3.1 Issues defined narrowly

“(a) The parties define for the court what the issues to be inquired into are. Legal proceedings are commenced by a party. The court has no power to bring matters before itself, and must wait to be seised of a case by a party. The parties then further define the issues which the court is to resolve, and once the issues are defined, both the court and the parties must confine their investigation to them. Procedurally, the issues are reflected in the statements of case or indictment. They are narrow and precisely defined, and may exclude much material which a historian would feel bound to consider in exploring the entire history of an event.” (Murphy)

5.3.2 Time limits

“(b) Legal disputes must be resolved within a reasonable time and at reasonable expense. The outcome of a judicial trial determines the rights and obligations of the parties, and may result in loss of life or liberty, loss of financial resources, of parental rights over children, or of reputation. There is no possibility of a detached, academic inquiry. Time limits are an integral part of the trial process, and the parties’ preparation of the case must be accomplished within the time limits established.” (Murphy)

5.3.3 Not objective

“(c) Trials are not objective inquiries into past events, but adversarial contests, in which parties, who have a vital interest in the outcome, not only decide what evidence they wish to present and prevent from being presented, but also present the evidence in as persuasive a manner as possible, a manner calculated to win them the sympathy and support of the court. Each party also seeks to persuade the court, by means of partisan, persuasive argument, to interpret the evidence in a light favourable to his case.” (Murphy)

5.3.4 Evaluations of standards and burdens of proof

“(d) A judicial trial is not a search to ascertain the truth of the past events inquired into, but to establish that a version of what occurred has an acceptable probability of being correct. It is in the nature of human experience that it is impossible to ascertain the truth of past events with absolute certainty. Nonetheless, a historian or a journalist is entitled to set his own standard of probability, which may correspond to truth as closely as he wishes. A court accepts predetermined standards of probability, which depend not on the facts of the individual case, but on the type of case under consideration. ...” (Murphy)

5.4 Evaluations of standards and burdens of proof

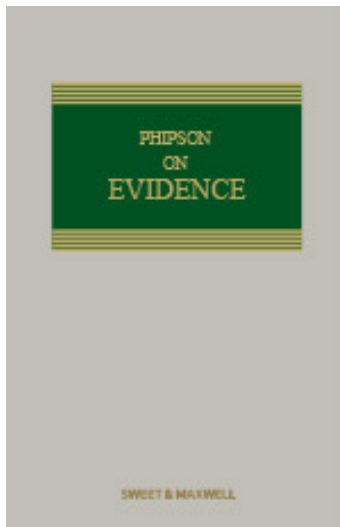
“(d) ...The highest standard of proof demanded by a common law court in any circumstances is proof beyond reasonable doubt. This is a high standard but falls well short of absolute certainty. This standard is demanded only of the prosecution on the issue of guilt in a criminal case; in all other cases, the standard is that of the balance of probability, i.e. that the event is more likely than not to have occurred as alleged. In relation to many secondary issues, an even lower standard is employed, that there is some evidence capable of supporting the proponent’s version of the event (a prima facie case).” (Murphy)

5.4.1 Jury

“(e) To the extent that juries are employed as triers of fact, the above considerations are compounded. Juries consist of laymen and women who have no training in the evaluation of evidence, and who are more likely to be swayed by partisan persuasive argument than those with professional experience of evidence.” (Murphy)

5.5 Phipson on Evidence

- Phipson on Evidence 18th edition (December 2013)



5.6 Classification of evidence

- No wholly satisfactory classification of the various forms of evidence (Phipson, paragraphs 1-10 to 1-18)
 - Direct evidence: “testimony of a witness as to any matter that he perceived by way of any of his own senses (excluding opinion)”.
 - Circumstantial evidence: “facts from which another fact or series of facts relevant to the case might be inferred or deduced”.
 - Real evidence: “evidence produced in court upon which the court is asked to reach conclusion on basis of its own perception and not that of witnesses directly or indirectly reported to it. They include material objects, tests and examinations of material objects, views of a locality outside the court which is relevant to the proceedings, the appearance of persons and the demeanour of witnesses.”
 - * Physical things and objects are dealt with under the heading of real evidence.

5.7 Meaning of terms

5.7.1 Facts in issue

“Facts in issue, which are sometimes called “principal” facts, are those necessary by law to establish the claim, liability or defence, forming the subject matter of the proceedings; and which are in dispute between the parties. In civil cases, the court may give directions about the issues on which it requires evidence.” (Phipson, paragraph 7-02)

5.7.2 Facts relevant to the issue

“Facts relevant to the issue, which are sometimes called “evidentiary” facts, are facts which *tend, either directly or indirectly, to prove or disprove a fact in issue.*” (Phipson, paragraph 7-03)

5.7.3 Relevant and admissibility

“In deciding whether evidence is admissible, to ask first whether the evidence is relevant and, thereafter, whether there are any rules or discretions, based on convenience or policy, which nonetheless make this relevant evidence inadmissible.” (Phipson, paragraph 7-05)

5.7.4 Relevance: tests and scope

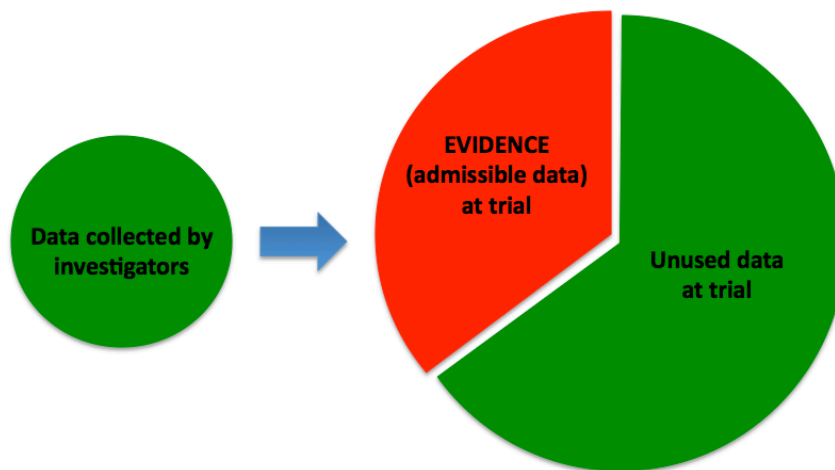
“The evidence that is relevant in a proceeding is evidence that, if it were accepted, could rationally affect (directly or indirectly) the assessment of the probability of the existence of a fact in issue in the proceeding.” - *section 55(1) of the Evidence Act 1995 (Commonwealth)* (Phipson, paragraph 7-09)

5.7.5 Weight of evidence

“For weighing evidence and drawing inferences from it, there can be no canon. Each case presents its own peculiarities and in each common sense and shrewdness must be brought to bear upon the facts elicited.”

“The weight of evidence depends on rules of common sense.” (Phipson, paragraph 7-17)

5.7.6 Admissibility



“Rules governing what facts or information may be placed before a court to prove a fact in issue, the manner in which that fact in issue may be proved and the degree of cogency that the evidence must have in order that the court may determine that fact has been proved.”

- *Evidence is admissible if a court may properly receive and consider it for the purpose of determining a fact in issue.*

5.7.7 Relevancy and probability

“A judge ...had to decide whether the evidence is capable of increasing or diminishing the probability of the existence of a fact in issue. The question of relevancy is typically a matter of degree to be determined ...by common sense and experience. Forensic science is science used for the purpose of law. It includes basic research to applied technology.” - Science and Technology Committee 7th Report of Session - 2005, Forensic Science on Trial, paragraph 4.

5.7.8 Tests of admissibility

- Is it relevant?
- Are there any other rules of evidence which may exclude the evidence?
- Discretion to exclude evidence?
- Determination of issues of admissibility of evidence

“The issue of admissibility of evidence is a matter of law and is for the trial judge to determine. The issue normally arises when one of the parties to the proceedings objects to the admissibility of the evidence. But, even if there is no objection to the admissibility of the evidence from the parties, where a judge considers that an item of evidence is clearly inadmissible, he should raise the issue with the parties and, if necessary, rule the evidence inadmissible.” (Phipson, paragraph 7-05)

5.7.9 Discretion to exclude evidence

- Objective: ensure that a fair trial of the accused took place
- The prejudicial effect of the evidence outweighs its probative value
- The evidence has been obtained in breach of constitutional protections;
- The evidence has been obtained by a trick.

5.8 Challenges to evidence

5.8.1 Evidence must be authentic, accurate, and complete for it to pass any standard of weight:

- Weight is a measure of the validity and importance.
- Admissible
- Authentic: Does the material come from where it purports?
- Accurate and reliable
- Complete: Is the story that the material purports to tell complete? Are there other stories that the material also tells that might have a bearing on the legal dispute or hearing?
- Convincing to Juries (Believable): Can the substance of the story and the material tells be believed and is consistent?

- In conformity with common law and legislative rules (admissible)

5.8.2 Two possible challenges to evidence to be tendered:

- The 'best evidence' rule;
- The rule against Hearsay.
- (there are other methods)

5.8.3 The 'best evidence' rule

"The 'best evidence' rule is concerned with the form in which the evidence is tendered, whereas the hearsay rule is concerned with the purpose for which the evidence is tendered." + The case of criminal damage of the tomb.

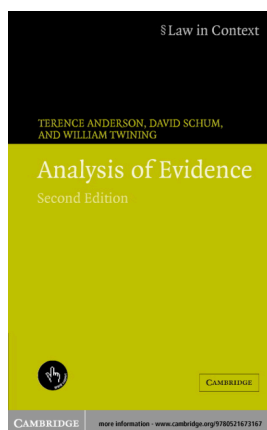
"At common law, for a document to be admissible it must satisfy what is known as the 'best evidence rule.' This rule states that documentary evidence will not be admissible unless it is the best evidence available to the party. That is, the original must be tendered where it is available to the party."

"For a copy of the original, or oral evidence of its contents, to be admissible, the absence of the original must be satisfactorily explained."

"However, if the absence of the original is satisfactorily explained, it is up to the parties whether they tender a copy of the original or give oral evidence of its contents. The method which is chosen goes only to weight."

6 Analysis of evidence

6.1 Analysis of evidence



6.2 Techniques of analysis (Chapter 1)

- The logic of proof and the law of evidence are closely related and interdependent
- Finding and joining the dots
- (graphical image removed!)

6.2.1 Example of connecting the dots:

“...several foreign nationals from the Mideast, with little or no prior training or experience, had enrolled in different civilian flying schools to learn how to fly large commercial aircraft. It was widely reported that they wanted to learn how to steer and navigate civilian airliners, but not how to make landings or takeoffs in these aircraft, and that they had all paid cash for the lessons.” (Chapter 1)

6.2.2 Identifying the reasons for suspicion:

- This seems suspicious: Why?
 - a) A trained pilot of any aircraft needs to know how to take off and land;
 - b) Several foreign nationals all doing something unusual in the same time may be acting in a coordinated way and belong to the same organization(s) or group(s);
 - c) A person who pays substantial sums of money using cash, rather than a credit card, check, or bank transfer, may be trying to conceal his identity or the source of the funds. Several people doing this simultaneously for the same type of transaction is even more suspicious.

“The analyst might have identified additional reasons for suspicion, but the reasons identified would have provided a sufficient basis for the next step.”

6.2.3 Generating hypotheses

- Why might someone want to be able to fly and navigate a commercial airliner, but not to land or take off?
 - Innocent hypotheses
 - Sinister hypotheses
- Innocent hypotheses

“They plan to learn to land and take off later. This is Part I of an unusual training scheme;”

“Flying an aircraft is simulated in many video games and these “students” wish to design more realistic games”;

“An airline is training non-pilot staff to relieve pilots on long haul flights”.

- Sinister hypotheses

“The flights these persons will be on board are for carrying drugs (or other contraband). They do not want to disclose the aircraft’s destination to the pilot until the plane is almost there”;

“The “students” plan to hijack one or more civilian airliners and the hijackers wish to control the flying and navigation prior to landing, but will force the pilot(s) to land at their chosen destination(s)”;

“It is not intended that the planes should land because they will be blown up in midair”;

“It is not intended that the airliners should land, because they will be used as

“flying bombs” directed at specific targets on an analogy with suicide bombers”.

6.3 Gathering of evidence (Chapter 2)

“Fact investigation may also appropriately be termed fact inquiry because a crucial ingredient of fact investigation is the asking of questions.”

“The investigator learns different things at different times in response to questions she asks”

“The investigator analyzes the then available data and hypotheses to refine the hypotheses (or generate new ones) and to determine whether and how the investigation should be directed or redirected. Given the analysis done, what further questions (further evidence and hypotheses) need to be addressed?” (Chapter 2)

6.4 Three types of logical reasoning and justification

- deductive 演繹
- inductive 歸納
- abductive 逆推/溯因

6.4.1 Deductive

- All As are Bs (major premise)
- X is an A
- X is necessarily a B
- In deductive logic, the major premise must be a statement that is universally true

6.4.2 Inductive

- Many As are Bs (major premise)
- X is an A
- X is probably a B
- The major premise is not universally true and ordinarily not stated. It is a generalization, a proposition, that may be true “usually,” “many times,” “more often than not,” “sometimes,” etc.

6.4.3 Abductive

- Surprising event A has occurred
- If H were true, A would follow
- There is reason to believe that H might be true.
- Reasoning process: “Rather than reasoning from a hypothesis to a conclusion based upon the evidence, it involves reasoning from the evidence to a hypothesis that might explain it. The surprising fact E1 is observed. But if hypothesis H were true, E1 would be a matter of course. Thus, there is reason to suspect that H might be true.”

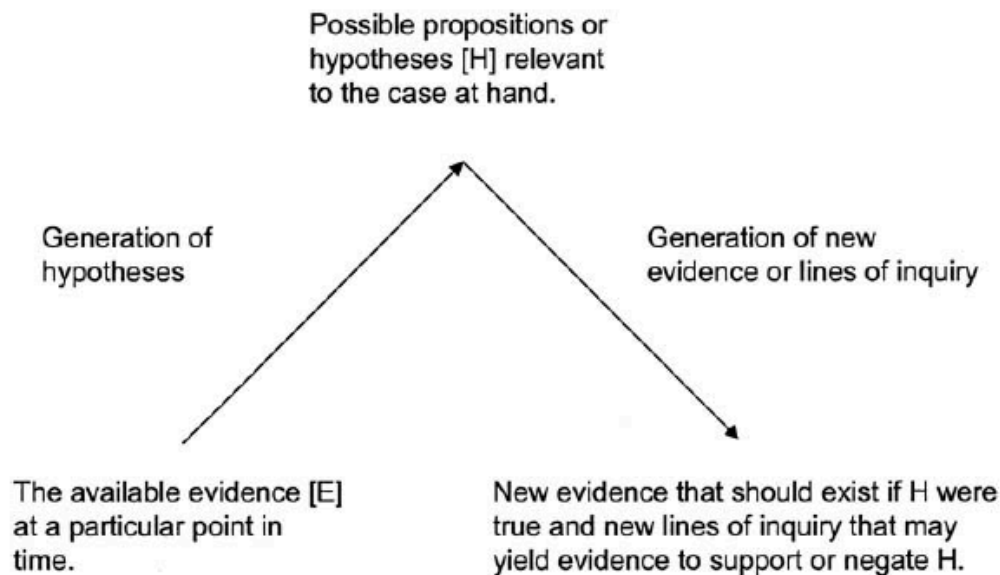


Figure 2.3 *A modified arch of knowledge*

“Peirce’s abductive syllogism defines the upward arm. The downward arm can be similarly expressed in syllogistic form. If H were true, then one or more of facts E2, E3, and E4 ought to exist. Assume H is true. Thus, there is reason to believe that one or more of facts E2, E3, and E4 exist.” (Chapter 2)

6.4.4 Summary

- Fact investigation activities always involve mixtures of abductive, inductive, and deductive reasoning. (Chapter 2)

6.5 Basis for a testimonial assertion

- personal knowledge: "I observed the occurrence of E for myself."
- second hand: "I did not observe event E myself, but I learned about its occurrence from person Q."
- opinion evidence: "I did not observe E myself. However, I observed two other events C and D from which I inferred that event E also occurred."
- Always ask, "How did you know?"

6.6 Analysis (Chapter 4)

"Every profession that engages in fact analysis and reasoning must develop ways of recording and organizing the data in forms suitable for analysis and use." (Chapter 4)

"...generalized set of procedures, a protocol, that ...may usefully be applied in any method of analysis." (Chapter 4)

6.7 Methods

- Chart method: a key-list (evidential and inferential propositions) and a chart (logical relationship)
- Outline method: simplifies ultimate probandum into simple propositions, and uses them as major headings and divided and subdivide
- Analytic devices
- A tool that aids in developing lines of inquiry for or in testing the quality and completeness of an analysis:
 - Chronologies
 - Narratives

6.7.1 Chronologies

- Propositions ordered in a strict chronology

6.7.2 Narratives

- Can the analysis be converted into a coherent narrative that is consistent with the theory of the case and that accounts for the available evidence, but that does not depend upon facts for which there is no evidence

6.8 Protocol for analysis

- Summary
 - “What is the ultimate proposition that must be proved?”
 - “What are the data that are available?”
 - “What are the plausible and defensible relationships between these data and the ultimate proposition?”
 - A protocol must consist of two components:
 - * a practicable method for organizing and conducting the analysis
 - * “a system for recording or expressing the results of the analysis in a usable form”

6.8.1 Seven-step protocol

- Clarification of standpoint;
- Formulation of the potential ultimate probandum or probanda;
- Formulation of the potential penultimate probanda;
- Formulation of the theories of the case;
- Recording the available data;
- Preparing the product(s); and
- Refining and completing the analysis.

6.8.2 Step 1. Clarify the standpoint

- “Standpoint is always a function of four dependent variables - time, objective (or purpose), materials available for analysis, and role.”
- “At what stage in what process am I?”
- “What materials are available for analysis?”
- “What am I trying to do?”
- “At what stage of the inquiry?”

6.8.3 Step 1. Clarify the standpoint

“post-trial and post-appeal, developing a closing argument based upon evidence given, preparing a matter for trial based upon a completed investigation, advising a client on proposed conduct or on how to structure proposed conduct with respect to the prospect of future litigation, organizational, evaluative, and advocacy, objectives.” (Chapter 4)

“the lawyer preparing for trial must examine the evidence from three standpoints and three roles in order to do the job completely: first, the role of advocate for her client; second, the standpoint and role of her opponent; and, finally, the role and standpoint of the trier of fact. What is her opponent likely to adopt as his theory of the case?” (Chapter 4)

6.8.4 Step 2. Formulate carefully and precisely the potential ultimate probandum or probanda.

- Legal knowledge come to assist:

“If a human being, a victim, is dead, and the victim died as a result of an unlawful act, and it was the accused who committed the act that caused the victim’s death, and the person who committed the act that caused the victim’s death acted with malice aforethought, then the accused is guilty of murder.” (Chapter 4)

“what are the legal consequence of the investigations?”

“what is the offence?”

“what are the elements”

“what is the cause of action”

6.8.5 Step 3. Formulate the potential penultimate probanda.

- A is dead.
- A died as the result of an unlawful act.
- It was B who committed the act that caused A’s death.
- The person who committed the acts that caused A’s death acted with malice aforethought.

6.8.6 Step 4. Formulate the provisional theories of the case.

“The theory of the case is the logical statement formulated as an argument supporting one or more conclusions about the case as a whole.” (Chapter 4)

“B had expressed jealous rage resulting in violence in his attempts to control A and prevent her from finally severing their relationship. His continuing jealous rage gave him a motive to murder her as the ultimate act of control, and the brutal manner in which she was murdered by multiple stab wounds shows that she was murdered by someone acting in a rage.” (Chapter 4)

“B was the only person who had acted against A in a jealous rage. He had a motive to try to maintain his control and to prevent A from acting independently, and he went to her house to kill her as the ultimate act of control.” (Chapter 4)

“B was the only person who had acted against A in a jealous rage. He had a motive to try to maintain his control and to prevent A from acting independently, and he

went to her house to kill her as the ultimate act of control." (Chapter 4)

"Therefore, it was B who murdered A in a jealous rage."

"In so doing, the analyst looks for data and evidence."

"The theory of the case of course is revised from time to time."

6.8.7 Step 5. Recording the available data.

"The evidential data must be recorded in propositional form."

- See assignment Question 2.

6.8.8 Chronology

"One common device of this kind is the chronology. Chronologies can be developed in two forms. One form is a chronology based upon the individual witnesses, documents, or other items of evidence. For each potential witness and exhibit place the events that can be asserted or shown in chronological order. The other form is a master chronology, which places each of the propositions supported by the data in a temporal sequence, indexed to the witnesses or documents by which they are to be established." (Chapter 4)

6.8.9 Step 6. Preparing the product(s)

"The product produced is a function of the method chosen - a key-list and chart in the chart method or an outline for the outline method." (Chapter 4)

"These methods and analytic devices overlap in ways that make it possible to convert material generated by an analytical device into the product of one of the methods of analysis and to transfer material recorded for one method into the product of the other. For example, the propositions in a master chronology are propositions that will appear in an outline and propositions from the chronology and the outline will appear in a key-list and chart." (Chapter 4)

6.8.10 Step 7. Refining and completing the analysis.

"the process of revision and refinement is continuous, with judgments previously made being revised in each succeeding step of the analysis to deal with any gaps discovered or flaws in the reasoning that are revealed as the process proceeds." (Chapter 4)

6.8.11 Summary

“...analyst to construct, test, and reconstruct arguments about questions of fact. It requires that the analyst articulate every step in an argument, breaking down the argument into simple propositions, and then mapping or “charting” all the relations between those propositions and the penultimate probanda (or the components of a hypothesis).” (Chapter 4)

6.9 An example

6.9.1 Step 1. Clarifying standpoint.

“Who are we?”

“We are the lawyers representing Richard Able in *United States v. Able*. The case is ready for trial and discovery has closed. The evidence in the case file is the only material available. We are preparing the case for trial and seek to marshal the available evidence and inferences to maximize the likelihood that Able will be found not guilty.” (Chapter 4)

6.9.2 Step 2. Formulating the ultimate probandum

“Richard Able (“RA”) knowingly filed a false federal tax return for the year 2003 (“the 2003 return”) with intent to defraud the government of income tax due and owing on not less than \$45,000.” (Chapter 4)

6.9.3 Step 3. Formulate the potential penultimate probanda.

- RA knowing filed a false income tax return for the year 2003.
- RA filed a tax return for the year 2003.
- The tax return that RA filed for 2003 was false.
- RA knew his 2003 tax return was false when he filed it.
- At the time RA filed his 2003 tax return, he intended to defraud the government of income tax due and owing on not less than \$45,000.
- RA owned the government taxes \$45,000 at the time he filed his 2003 tax return.
- RA intended to defraud the government of the taxes due and owing at the time he filed his 2003 tax return.

6.9.4 Step 4. Formulate the provisional theories of the case

“For any case, the analyst must formulate what she sees as the strongest provisional theories of the case for both sides.” (Chapter 4)

“This is necessary for two reasons. First, the advocate needs to know the theory she is most likely to confront in order to assess how the evidence will be marshalled against her client. Second, if the opposing theory is not developed, the

advocate may wind up developing a theory that misses the point, a theory that attacks a "straw man" (Chapter 4)

6.9.5 Step 4. Formulate the provisional theories of the case

- Prosecution theory

"Prior to leaving practice in 2002, RA was earning more than \$450,000 per year. When he became a professor, his income dropped precipitously. The amount he needed to support the lifestyle he wanted to maintain and meet his other obligations exceeded the amount that the law school paid him. His income for 2003 was \$170,000 - \$125,000 from the law school and \$45,000 in fees. ..." (Chapter 4)

"In order to avoid paying the additional amount that was due as a result of the \$45,000 in fees he had received, RA filed a false tax return that only reported the \$125,000 he had earned as salary and from which an amount sufficient to satisfy the taxes due on that amount had been withheld. Thus, RA knowingly filed a false tax return for 2003 with intent to defraud the federal government of the taxes that were due and owing on the additional \$45,000 he had received as fees." (Chapter 4)

- Defence theory

"RA fully disclosed all his income to Timothy Cooper, his accountant, and relied upon Cooper to prepare and file his pre-signed return. RA informed Cooper he had received \$125,000 in salary from the law school at their first meeting. On April 12, his girlfriend, Jane Evans, delivered a letter to Cooper's office advising him that RA had also earned \$45,000 in fees. With that letter RA enclosed a blank tax return that he had signed and a signed check payable to the Internal Revenue Service with the amount left blank. In that letter, RA advised Cooper that he was going to be out of town until after April 15, 2004, and instructed Cooper to complete the return and to insert in the check the amount that was due to the government. ..." (Chapter 4)

"Thus, RA did not know that the tax return Cooper prepared and filed was false and RA fully intended to pay any additional taxes that were due and owing on the \$45,000 he had received as fees." (Chapter 4)

6.9.6 Step 5. Formulate the key-list

"every proposition that the analyst concludes is important to the arguments in support of and against the ultimate probandum." (Chapter 4)

“propositions involving only one condition and susceptible to the response”

“true/false,” “proven/not proven,” “probable/not probable,” etc.

“clear and precise”

“ordering”

“one point only, drafted in the affirmative rather than the negative”

6.9.7 Step 6. Preparing the chart(s)

“start charting the ultimate and penultimate probanda and work down.”

“break into sectors”

“witness may appear more than once”

“linkage is genuine inference”

6.9.8 Step 7. Refining and completing the analysis.

“Typically, the process of revision and refinement is continuous, with judgments previously made being revised in each succeeding step of the analysis. But the chart and key-list completed through step 6 provide the first real opportunity for analysing and evaluating the case-as-a-whole and testing the judgments initially made.” (Chapter 4)

6.10 Symbols and uses

6.10.1 The basic Wigmorean palette

- the square for depicting testimonial assertions;
- the circle for depicting circumstantial evidence or inferred propositions;
- > the open angle to identify an argument that provides an alternative explanation for an inference proposed by the other side;
- ◁ a vertical triangle to identify an argument that corroborates a proposed inference;
- a line to indicate the “direction” of a proposed inferential relationship
- ↑ between or among propositions – a vertical line indicates “tends to support”; horizontal lines indicate “tends to negate or weaken.” The direction from evidential data to asserted inferences is always up, from bottom to top. Directional arrows are only occasionally necessary where the line standing alone might be misunderstood.¹⁰
- ←

6.10.2 Three additional symbols

- ∞ (6) an infinity symbol to identify testimonial assertions that the fact finders will hear or other autoptic preferences they will perceive with their other senses;
- ¶ (7) a paragraph symbol to identify facts the tribunal will judicially notice or otherwise accept without evidential support; and
- G (8) the letter “G” to denote a generalization that is likely to play a significant role in an argument in a case, but that is not a proposition that will be supported by evidence or that the tribunal will be formally asked to notice judicially.

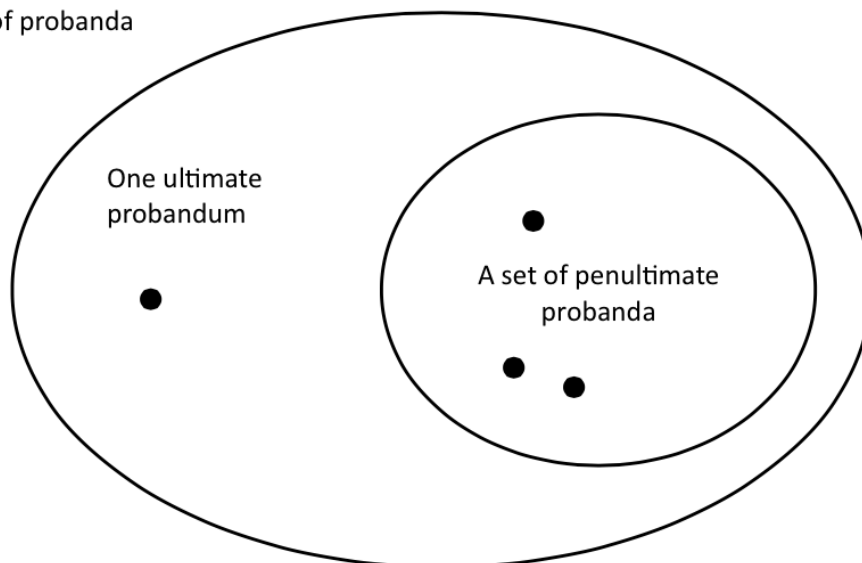
6.10.3 Top Down Approach

- Wigmore's analysis works from top downwards
- The starting point is the ultimate probandum : something which must finally be proved.

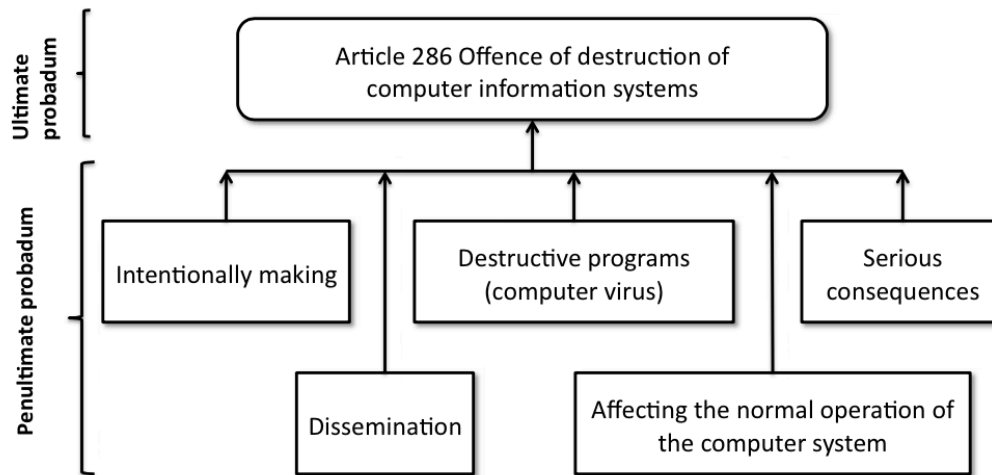


- A set of probanda
 - Wigmore referred to hypotheses to be proved as probanda
 - This set of probanda consists of
 - one ultimate probandum (ultimate issue)

A set of probanda

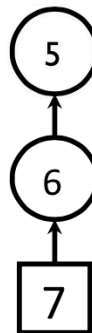


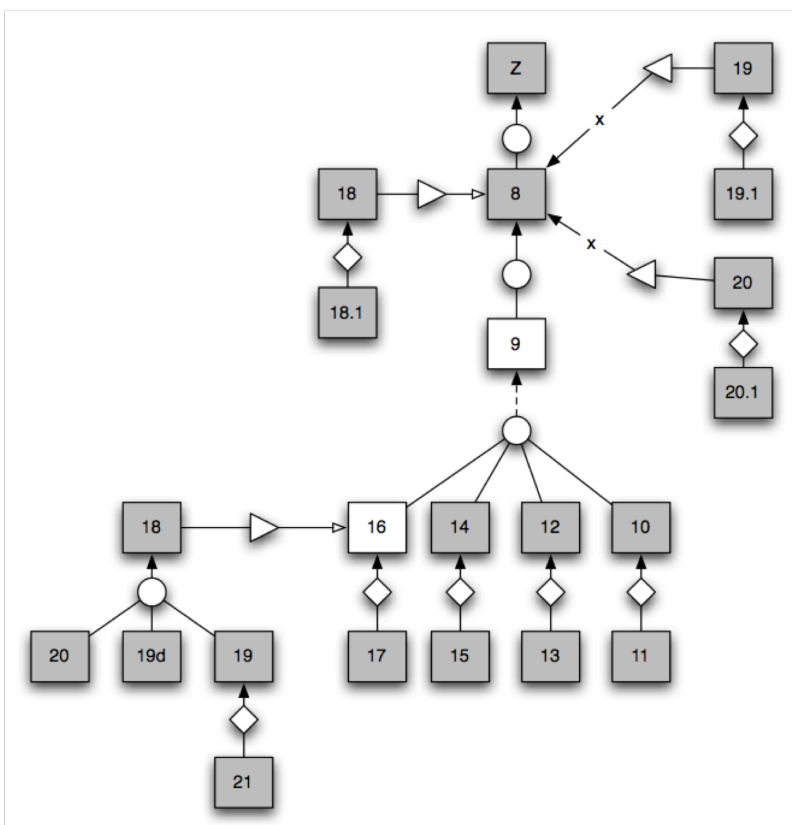
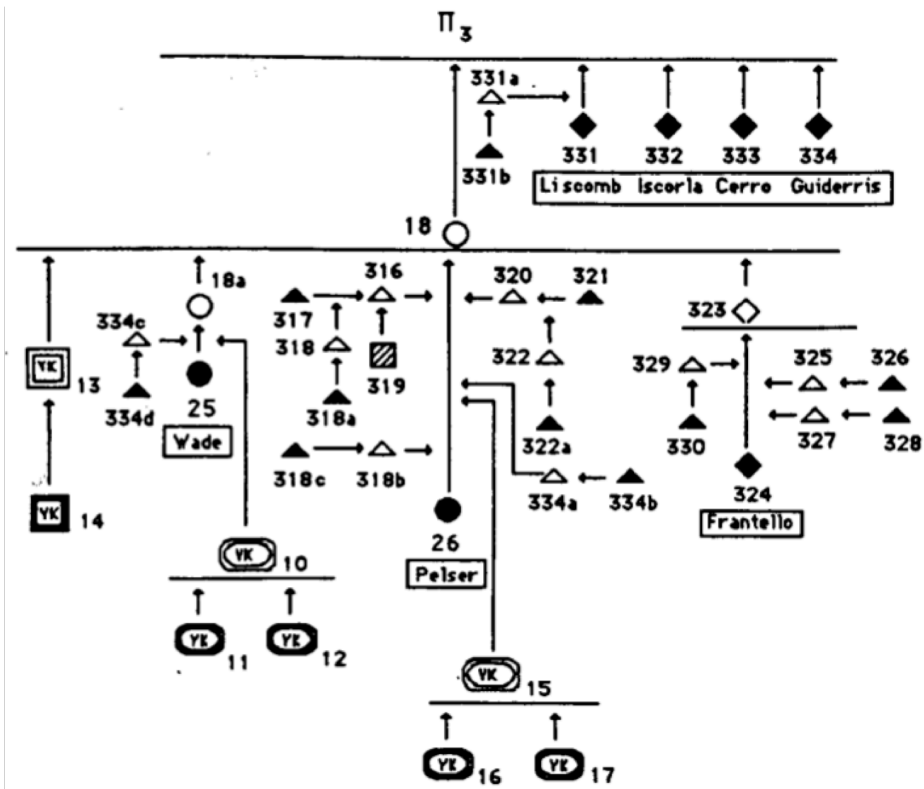
6.10.4 Probanda for the Panda Incense Case



6.10.5 Examples of charting method

- A graph consists of nodes and arcs.
- An arc is represented by an arrow whose head shows the direction of inference from one node to another.





6.11 Advantage

- Where am I? (lost in a maze) (graphical image removed!)

6.11.1 Terence Anderson, David Schum, William Twining, *Analysis of Evidence*, page 142.

- “Identify and articulate precisely each proposition”
- “Specify with precision each step in each argument being advanced”
- “Marshal all the relevant and potentially relevant data in a complex case into a single, coherent and clear structure in the form of an argument”
- “Makes reasoning explicit and sharable”
- “Deal with problems too big to hold in your head at once - and can switch magnifying powers”

7 Epilogue

7.1 Summary

- Characteristics of an investigator
- Ethics and codes of conduct of an investigator
- Meaning of forensic
- Process of proof
- Meaning of terms related to evidence
- Reasoning methods during investigation
- Wigmorean charts analysis