

The Probative Value of Audit Evidence

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The State of the Art and Avenues Towards a General Theory

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October 2005

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ABSTRACT: Auditors must assess whether financial statements present fairly the actual state of a firm's affairs. However, this state usually does not exist when the audit is carried out and can no longer be observed by the auditor. Rather, the auditor is dependent on audit evidence to draw conclusions about the affairs in question. Professional auditing standards require auditors to assess evidence critically, including consideration of possible fraud. Audit quality directly depends on correctly evaluating the probative value of evidence, which is indispensable for a correct reconstruction of the affairs in question.

However, current auditing literature virtually does not take note of this problem. A better understanding or even a theory of probative value would be important. Prior research on this topic is scattered and for the most part not even noticed by today's auditing research. Scientific progress in this field requires a thorough review of the existing literature – the consolidation of the scattered findings is a necessary preparatory step for any future research. Therefore, after a theoretical analysis of the auditor's "recognition-of-reality-problem" in the introduction, this paper (1) offers a systematic review of the relevant auditing literature and (2) integrates the existing research findings into a conceptual framework, i. e. a general model of the factors that affect the probative value of audit evidence. Conceptual frameworks are an important research instrument for giving a theoretic account of a complex problem, for which there is not yet an established theory, and for guiding and directing future research. Accordingly, the paper concludes with an outline of future research avenues.

Key Words: *Audit Evidence, Probative Value, Persuasiveness, Reliability, Recognition of Reality*

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“Objectively obtaining and evaluating evidence is the essence of auditing.”

(AAA, Committee on Basic Auditing Concepts, 1973, p. 2)

1. Introduction: The probative value of evidence as a crucial question in auditing

1.1 The problem of reconstructing an unobservable reality

Recent financial statement manipulations such as by *Enron*, *Worldcom*, or *Parmalat* revealed that information provided by financial statements does not always correspond with reality. At least in the most recent case of *Parmalat*, as well as in the cases of *Comroad* and *FlowTex* in Germany, management counterfeited documents and receipts for non-existent assets or transactions. These scandals illustrated clearly that it is not enough to rely on documents, receipts, or management representations to be what they seem at first glance. Rather, the auditor must go beyond the façade and question the truth of any information received. With these developments, standard setters have tightened professional auditing standards. Their reaction was to strengthen the requirement of professional skepticism, of a critical evaluation of audit evidence, and of explicitly considering the possibility of fraud.¹ Independent of possible manipulations, auditors are required to judge whether financial statements provide a true and fair view of the audited entity’s financial position, results of operations, and cash flows.²

However, there is no established theory or any well-founded framework of criteria, which would assist the auditor in fulfilling his task to correctly evaluate the truth of information that serves as audit evidence. So, standard setters and auditing research have just shifted the problem to the auditor. The auditor is practically left alone and must resolve the problem “somehow” on his own.

To comply with professional standards, the real situation and the real transactions of the entity must be considered explicitly during the audit. It must be verified that the financial statements not only correctly (i. e. GAAP-conforming) reflect the contents of accounting records and receipts, but also accurately represent the underlying state of affairs. In other words, there must be a systematic comparison between the actual affairs (the “relevant reality”) and the state of affairs asserted by management within the financial statements (see Figure 1 below). The financial statements’ assertions are available to the auditor and can be directly perceived, while the underlying reality cannot. Financial statements predominantly refer to past facts and transactions that ordinarily do not remain in existence until the audit, so they can no longer be perceived directly by the auditor.³ From the auditor’s point of view, these past transactions are hidden behind an “imaginative wall” as illustrated in the figure below.

¹ See AU 316; ISA 240.

² See AU 110.01; ISA 200.2 and 14.

³ Financial statements also contain information that refers to the future. For example, the reported provisions reflect the management’s expectation of future financial obligations. Nevertheless, information about the past clearly prevails.

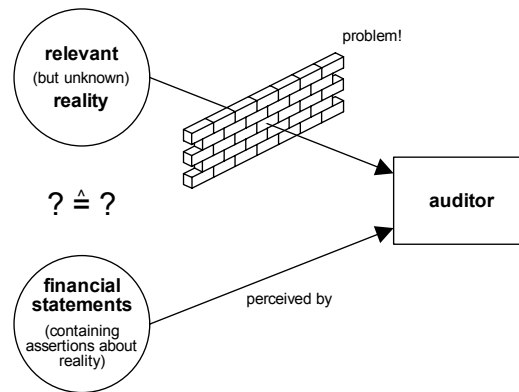


Figure 1: The auditor's "recognition-of-reality-problem"

For comparing the statements with the underlying reality and assessing their truth, the auditor is dependent on indications to draw conclusions about reality. This means that the auditor needs information about the reality, which is situated "in front of the wall" (see Figure 2 below). Such information ordinarily is called "audit evidence" and refers to any kind of "traces" of the relevant reality, for example documents prepared in the course of transactions, statements of individuals who observed the facts first hand, etc.⁴

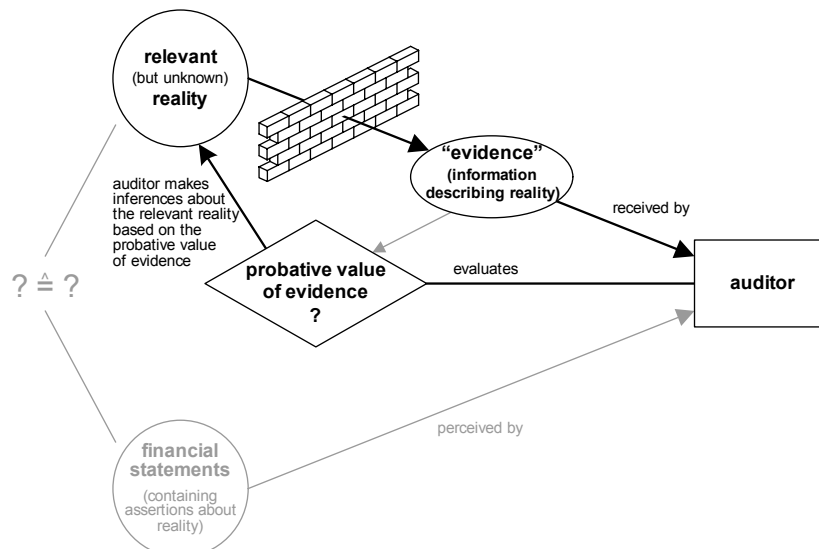


Figure 2: The auditor's recognition problem – the way out

In the figure, "evidence" is put into quotation marks to make clear that the term does not refer to pieces of information that necessarily are highly reliable or that verify the relevant reality almost "for sure". Rather, in this study, "evidence" and "audit evidence" are used as neutral terms with regard to reliability. The quality and strength of evidence is represented exclusively by the concept of probative value⁵. Evidence usually *indicates* a certain state of affairs. However, as the relevant reality remains unobservable, the auditor can only *indirectly* draw conclusions about this reality based on the evidence and its probative value.

Only if the auditor correctly reconstructs the relevant reality, is he able to assess the truth of the financial statements and judge whether they present fairly the actual state of affairs. The

⁴ For an enumeration of possible items of audit evidence see ISA 500.3-6; Proposed SAS "Audit Evidence", paragraphs 2-5.

⁵ Other terms used for "probative value" in auditing literature are "reliability" and "persuasiveness". All these terms relate to similar concepts and are used synonymously in this paper.

correct reconstruction of the relevant reality depends on the appropriateness, i. e. the probative value, of the evidence used to draw conclusions about this reality.

1.2 The significance of understanding the probative value of evidence for audit theory and practice

The importance of the probative value of audit evidence as outlined above makes this a key topic within audit theory.⁶ *Flint* points out: “The theory of audit evidence is at the core of audit theory. Development of a theoretical framework requires an identification and analysis of the characteristics of audit evidence and an interpretation of probability theory and statistical inference in relation to the persuasive value of different types of audit evidence.”⁷ This statement indicates two basic avenues for the development of audit evidence theory: analytical and conceptual approaches that aim to identify and analyze factors that affect the probative value of audit evidence on the one hand and formal models of the probative value on the other hand. Research conducted in both areas will be summarized in section 2.

Overall, there was less research than expected, considering the significance of the topic. In particular, to date there is no comprehensive theory of the probative value of audit evidence.⁸ While the most elaborate concepts are to be found within the formal approaches, these models have an important limitation: they only allow aggregating the probative value of single items of evidence to an overall value. The probative values of these individual items need to be judged subjectively without any theoretical foundation. This deficit can be overcome only by analytical and conceptual research, coupled with empirical investigations. However, findings in this area of research are sparse and have not been integrated into a unified concept. Therefore, it is important to consolidate the existing findings and to carry out more research.

Besides the relevance of the topic for audit theory, assessing the probative value of evidence is of the utmost importance in audit practice: “The quality of the evidence and extent of it determine the terms of an auditor’s opinion or report, so that a vitally important task for auditors is to assess the meaning, significance and persuasiveness of evidence for the issue to which it relates.”⁹ The quality of an audit, measured by the correctness of judgment, directly depends on whether the evidence used for reconstructing the relevant reality is appropriate and whether the probative value of the evidence is properly evaluated. So a good understanding of the factors and processes that determine the probative value of audit evidence is important.

However, within current auditing literature, this topic is not discussed and usually not even mentioned. Prior research that dealt with the probative value of audit evidence is broadly scattered. Most of it is included in monographs, which are practically not perceived by today’s research – at least as far as the topic of probative value of evidence is concerned.¹⁰

⁶ See *Flint* (1988, p. 32); *Richter* (2002, p. 40); *von Wysocki* (2005).

⁷ *Flint* (1988, p. 32).

⁸ See *Caster/Pincus* (1996, p. 1).

⁹ *Flint* (1988, p. 106).

¹⁰ For example, for the relevant monograph by *Hatherly* (1980), there is just one recorded citation in the *Social Sciences Citation Index* (2005). The paper by *Caster/Pincus* (1996), which is the most recent one from the analytical line of research (that includes both conceptual and empirical research, see section 3.2 below for a review of this research), was only cited two times within auditing research according to the Index (without counting the two discussions of the paper by *Srivastava*, 1996, and *Hollingshead*, 1996). Research on formal models for the aggregation of several evidence items (see section 3.3 below for a review) is cited more frequently. For instance, for the paper by *Dutta/Srivastava*, 1993, there are 11 citations recorded in the Index. However, these models do not provide any assistance for judging the truth status of a particular piece of information. So they do not offer any assistance for solving the auditor’s “recognition-of-reality-problem” outlined above.

For scientific progress in this field, a thorough review of the existing literature is essential. This review must bring together the scattered findings in order to make explicit the state of the art in a well-structured manner, which is a necessary preparatory step for any future research. Therefore, a systematic review of the existing auditing literature that is relevant to the topic will be done in this paper. Following the review, the existing research findings will be integrated into a conceptual framework. This framework provides a general model of the factors that affect the probative value of audit evidence and illustrates the relationships between these factors. Conceptual frameworks are an important research instrument that serves at least two purposes:¹¹ (1) to give a theoretic account of a complex problem, for which there is not yet an established theory, and (2) to direct future research that leads to a refinement, extension and/or revision of the conceptual framework. So, as a long-term objective, the framework should develop more and more towards a theory.¹²

The remainder of this paper is organized as follows: The next section deals with the guidelines concerning audit evidence and its probative value, as provided by professional auditing standards. Prior research on the probative value of audit evidence is summarized in section 3, reviewing analytical research in section 3.2 and formal research in section 3.3. The paper concludes in section 4 with a summary of the basic findings, the proposal for an integrated conceptual framework and an outline for future research.

2. The probative value of evidence within professional auditing standards

Both the *IAASB* of the *IFAC* and the *ASB* of the *AICPA* have issued (proposed) standards that deal exclusively with the matter of audit evidence. The last important regulatory changes were the revision of audit risk and fraud standards. The results of this process are the revised ISA 500 “Audit Evidence” issued by the *IAASB* and the SAS “Audit Evidence” proposed by the *ASB*, which has not yet passed.¹³ These rules are similar to each other in all material respects. Besides, statements regarding the collection and evaluation of evidence are included in several other standards.¹⁴

This revision led to an increased emphasis on the critical assessment of audit evidence. The old version of ISA 240, which deals with the auditor’s responsibility to consider fraud, stated: “[...] unless the audit reveals evidence to the contrary, the auditor *is entitled* to accept records and documents as genuine.”¹⁵ This entitlement was revoked in the revised version: “Unless the auditor has reason to believe the contrary, the auditor *ordinarily* accepts records and documents as genuine.”¹⁶ AU 316 does not even contain a similar passage of this kind.

Moreover, the auditor is required to maintain an attitude of professional skepticism.¹⁷ Professional skepticism is defined as “an attitude that includes a questioning mind and *a critical assessment of audit evidence*.”¹⁸ Furthermore, according to the standards, an audit

¹¹ For a detailed discussion of the purposes, functions and characteristics of conceptual frameworks as a research instrument and their contribution to scientific progress see *Kubicek* (1977, pp. 12-28); *Wollnik* (1977, pp. 53-58); *Grochla* (1978, pp. 61-67); *Richter* (1997, pp. 30-32; 1999, pp. 265-266); *Schreiber* (2000, pp. 29-31).

¹² See *Richter* (1997, p. 31; 1999, p. 266).

¹³ The proposed SAS on audit evidence will supersede SAS No. 31 “Evidential Matter”, AU 326, when approved.

¹⁴ See, e. g., ISA 240 and AU 316 that deal with the auditor’s responsibility to consider fraud, or various standards that deal with specific types of audit evidence such as external confirmations (ISA 505; AU 330) or information provided by an expert (ISA 620; AU 336).

¹⁵ ISA 240[old version], paragraph 19 (italics added).

¹⁶ ISA 240.26 (italics added).

¹⁷ See ISA 240.24; AU 230.07-.09.

¹⁸ ISA 240.23 (italics added); similarly AU 316.13.

“rarely involves the authentication of documents, nor is the auditor trained as or expected to be an expert in such authentication.”¹⁹ However, the passage continues: “[...] if conditions identified during the audit cause the auditor to believe that a document may not be authentic or that terms in a document have been modified, the auditor investigates further, for example confirming directly with the third party or considering using the work of an expert to assess the document’s authenticity.”²⁰ That is, the auditor must critically evaluate the probative value of the evidence.²¹

A central requirement is that the audit evidence has to be *sufficient* and *appropriate* to provide a reasonable basis for the audit opinion.²² While sufficiency is the measure of the quantity of evidence, appropriateness refers to its quality, which itself is defined as its relevance and reliability in providing support for the assertions in question or in detecting misstatements, respectively.²³ This concept of appropriateness is closely related to the question of the probative value of audit evidence.

However, in spite of the importance and difficulty of assessing the probative value of audit evidence, there is relatively little guidance within the professional standards. The source, nature, and individual circumstances under which it was obtained, are mentioned as factors that influence the reliability of audit evidence. Some heuristic rules or generalizations about the reliability of audit evidence, subject to possible exceptions, are also offered. According to these rules, (knowledgeable) sources outside the entity under audit are more reliable, evidence from within the entity is more reliable when its generation was subject to effective controls, direct evidence is better than evidence obtained indirectly or by inference, documented evidence is more reliable, and original documents are more reliable than photocopies or facsimiles.²⁴

In the more specific standards that deal with external confirmations, management representations, analytical procedures, and the use of the work of internal audit, other auditors, or experts, there are few additional clues concerning the probative value of evidence. The competence and objectivity of the sources consulted, the care the information source took when generating or processing the evidence, and the effectiveness of relevant internal controls are mentioned as factors that affect the reliability of evidence.²⁵

Within the more general standards on audit evidence, the relation between the quality and quantity of audit evidence is dealt with. Particularly, the higher the quality of audit evidence, the less of it that is required; whereas merely obtaining more evidence cannot compensate for poor quality. Another aspect to consider is whether different items of evidence corroborate each other or whether there are contradictions and inconsistencies that must be resolved, usually by obtaining additional evidence. The assurance derived from corroborating items of evidence increases when the nature and sources are different and independent. Considered jointly, the assurance provided by such items of corroborating evidence may exceed the assurance provided by the individual items.²⁶

¹⁹ ISA 240.26; similarly ISA 500.10, AU 316.09, and Proposed SAS “Audit Evidence”, paragraph 9.

²⁰ ISA 240.26; similarly AU 316.68, footnote 26.

²¹ See also the explicit requirements in ISA 500.10, and Proposed SAS “Audit Evidence”, paragraph 9.

²² See ISA 500.2; Proposed Amendment to SAS No. 95, paragraph 3.2.3 (Third Standard of Field Work).

²³ See ISA 500.7; Proposed SAS “Audit Evidence”, paragraph 6.

²⁴ See ISA 500.9; Proposed SAS “Audit Evidence”, paragraph 8.

²⁵ See ISA 505.6, 28, and 29; ISA 520.12c and 12d; ISA 580.6 and 9; ISA 600.7; ISA 600[proposed revision].78; ISA 610.13 and 17; ISA 620.8-10; AU 322.05 and .09-.11; AU 329.16; AU 330.26-.27; AU 333.02 and .04; AU 336.08-.11.

²⁶ See ISA 500.7 and 12; Proposed SAS “Audit Evidence”, paragraphs 6 and 11; AU 319.100-.104.

3. Research on the probative value of audit evidence

3.1 Overview

The two basic lines of research on the probative value of audit evidence are analytical approaches and formal approaches. The latter provides formalized views that allow the application of mathematical methods, which can be used for aggregating the probative value of several items of evidence to create an overall value. These approaches are quantitative in nature. Analytical approaches comprise qualitative analyses of the probative value of audit evidence, including that of individual items. These approaches may be subdivided into substantive views and generic views.²⁷ While substantive views are based on a distinction between several types of audit evidence, generic views strive for identifying the general characteristics that influence evidence's probative value.

3.2 Analytical approaches

3.2.1 Substantive views

3.2.1.1 Conceptual research

Substantive views emphasize the sources and procedures for acquiring audit evidence.²⁸ The basic idea behind these views is that a distinction between several types of audit evidence allows or at least facilitates making generalizations about their probative value. Accordingly, the first step within these approaches is a distinction between various evidence types. Next, the probative value of each type of evidence is analyzed, either separately or comparatively. This analysis may involve the application of some general factors that influence the probative value. So within substantive views, generic aspects of the probative value of audit evidence may be included.

²⁷ See Ashton, R. H. *et al.* (1988, pp. 98-99).

²⁸ See Ashton, R. H. *et al.* (1988, p. 98).

Stettler (1954)	Mautz (1958) / Windal (1961) *	Mautz/Sharaf (1961) **	Arens (1970)	Hagest (1975)	Hatherly (1980)	Flirt (1988)	Barnes (1991)
physical evidence	physical examination/ count recomputation retracing bookkeeping procedures	natural evidence physical examination calculations	real evidence physical examination recomputation	physical inspection	physical observation recomputation	physical productions/ personal observation	physical evidence inspection or observation
documentary evidence created externally, sent directly to the auditor created externally, in the client's possession origination within the client's organization	testimonial evidence inquiry confirmation	created evidence statements by independent third parties written oral statements by officers and employees formal informal	testimonial evidence statements by third parties	inquiry statements by third parties statements by management and employees formal informal	statements by third parties representations by management	oral evidence	oral evidence
documentary evidence created externally, sent directly to the auditor created externally, in the client's possession origination within the client's organization	indirect evidence examination of authoritative documents	authoritative documents prepared outside the enterprise prepared inside the enterprise	documentary evidence originating outside the organization	documents created externally; not passed through client's organization created externally; in the client's possession created internally	external documents internal documents	written evidence	documentary evidence
account books	examination of subsidiary records	subsidiary or detail records	other evidence subsidiary or detailed records		accounting records	deductive reasoning	analytical evidence reasoning, reclassifications, comparisons, calculations
comparisons and ratios	scanning correlation with related information	rational argumentation interrelationships with other data subsequent actions	calculations or correlations		related accounts expectations post-balance sheet events analytical review **** accounting system and its internal controls **** compliance evidence **** detailed substantive tests ****	deductive reasoning	analytical evidence reasoning, reclassifications, comparisons, calculations

*) The assignment of the audit techniques to the three general categories of evidence is done by Mautz only; Windal just borrows the categorization of audit techniques from Mautz.

**) The assignment of audit evidence types to the broad categories as shown here is not provided by Mautz/Sharaf themselves, but was arranged by the author of this paper.

Mautz/Sharaf provide each categorization separately, i. e. the three general types of evidence on the one hand and the specific types of audit evidence on the other hand.

****) Not part of the list of audit evidence types offered by Hatherly, but part of the "audit evidence process" discussed by him in a separate analysis.

Table 1: Synopsis of categorizations of different types of evidence (substantive views)

Substantive views were generally adopted in the first articles on audit evidence. Table 1 above provides a synopsis of the categorizations proposed by the authors who, at least partly, followed such a view. The lists offered differ from each other. So, for instance, some authors categorize primarily by the form or “nature” of audit evidence (e. g., physical productions, written evidence, oral evidence, and deductive reasoning)²⁹. Others relate types of evidence to procedures that result in obtaining such evidence.³⁰ However, as suggested by the table, the different categorizations fit into a comparative scheme. From this scheme, some basic types of evidence become apparent, including physical (“real”, “natural”) evidence, testimonial evidence (often provided orally as answers to inquiries), documentary evidence, and analytical evidence.

Most authors describe physical evidence and recomputations done by the auditor as providing a high level of assurance and being the most reliable types of evidence.³¹ However, such evidence has only limited availability in an audit. Particularly, it may be available for the physical existence of machinery, stock, and the like, or for the mathematical correctness of calculations. For the other types of audit evidence, rankings of their relative reliability are normally not offered. An exception is *Mautz* who describes testimonial evidence as second best after real evidence and indirect evidence as the least reliable type; although *Mautz* refers to important exceptions to this generalization.³² Most authors analyze each type of evidence separately, discussing peculiarities, exceptions, special factors that influence reliability, and then describe certain situations in which evidence is either more or less reliable.

For instance when discussing the reliability of documentary evidence, there is often a distinction made between documents that originated inside and outside the enterprise under audit and whether they passed through the client’s organization in the latter case. Documents that have not passed through the client’s organization are usually considered the most reliable ones, followed by those created outside that are in the possession of the client. Those that were prepared inside the client’s entity are considered the least reliable ones.³³ A similar distinction is made for testimonial evidence (statements by third parties vs. statements by officers and employees of the client organization).³⁴ The driving variable behind both distinctions is the independence of the evidence source.

For the development of a theory of the probative value of audit evidence, substantive views with their focus on specific types of evidence are not an adequate starting point. Developing a theory requires generalization and abstraction. Therefore, as a first step, common features of *all* types of evidence that influence probative value must be looked for. Starting with a classification of types leads to introducing the same criteria several times and makes it more difficult to identify generally valid factors.

3.2.1.2 Empirical research

Considerable empirical research concerning the reliability of certain types of audit evidence has only been carried out for confirmations of accounts receivable and analytic procedures.³⁵ In several empirical studies, confirmation requests for accounts receivables with seeded errors

²⁹ See, e. g., *Flint* (1988, pp. 31-32 and 113-115).

³⁰ See, e. g., *Mautz* (1958); *Winald* (1961).

³¹ See *Stettler* (1954, p. 123); *Mautz* (1958, p. 44); *Winald* (1961, pp. 396, 398, and 400); *Mautz/Sharaf* (1961, pp. 82 and 85); *Arens* (1970, pp. 110-112 and 121); *Hagest* (1975, pp. 51-53); *Hatherly* (1980, p. 14).

³² See *Mautz* (1958, p. 44).

³³ See, e. g., *Stettler* (1954, pp. 123-125); *Arens* (1970, p. 117); *Hagest* (1975, pp. 53-55).

³⁴ See, e. g., *Arens* (1970, pp. 112-116); *Hagest* (1975, pp. 55-57).

³⁵ For reviews of this research see *Caster et al.* (2000, pp. 76-77), and *Spires/Yardley* (1989). For confirmations of accounts receivable see *Gronewold* (2001, pp. 68-86), including a detailed analytic evaluation of their probative value.

were mailed to customers of real audit clients. These studies produced very similar results in that many errors remained undetected by the customers. Furthermore, errors unfavorable to the customers (overstatement of the balance) were reported more often than favorable understatement-errors.³⁶ As a whole, the results of these studies show that errors detected by confirmations may not be representative of the actual errors in the population under audit, which places a significant limitation on the probative value of confirmations as audit evidence.

Archival studies showed that a considerable portion of misstatements was initially detected using analytical procedures,³⁷ which could lead to a relatively high degree of reliability being attributed to this type of evidence. However, an important portion of misstatements are *not* detected by analytical procedures and analytical procedures are inadequate for detecting the absence of error.³⁸ Furthermore, the effectiveness of audit procedures measured by the *initial* detection of errors depends on the timing of these audit procedures. As analytic procedures are usually performed at an early stage, their effectiveness may be systematically overestimated.³⁹ Overall, the reliability of analytic procedures alone is limited.⁴⁰

3.2.2 Generic views

3.2.2.1 Conceptual research

3.2.2.1.1 Overview

Generic views focus on general factors that affect the probative value of audit evidence. Several authors discussed such factors explicitly, for instance *Windal*, *Arens*, *Hagest*, or *Knüppe*.⁴¹ However, many of the authors who exclusively or partly adopted substantive views did not do so. They did use some criteria for the analysis of the probative value of evidence, but these factors were left more or less implicit. In part, different criteria were used for the analysis of different types of evidence. Table A.1 in the appendix provides a synopsis of factors relevant to the probative value of evidence that were discussed or used implicitly by authors on the topic. The overview includes the articles already considered within the substantive views as well as specific contributions that follow generic views.

For the creation of the table it was not important whether factors were stated explicitly as determinants of the probative value of evidence, used implicitly, or mentioned for only specific cases and types of evidence. The factors dealt with by the various authors differ from each other in both content and labeling. The table shows the factors as labeled by the authors, but arranged in a comparative order, so that factors referring to the same or related issue are shown on the same line of the table. The variables were arranged in five major groups: factors referring to the source of evidence, factors referring to the production and transmission of evidence, characteristics of evidence and factors referring to the relation of evidence to the assertion in question, factors referring to the auditor as evaluator of evidence, and finally factors referring to the combination of several items of evidence. Although these categories are not always clear-cut, they are suitable for structuring the numerous variables. A condensed

³⁶ See *Sauls* (1969), *Hubbard/Bullington* (1972), *Warren* (1973, 1974, and 1975), *Sorkin* (1977), *Armitage* (1990), *Caster* (1990), and *Engle/Hunton* (2001); whereas *Ford* (1974, pp. 59-61), and *Yeary* (1975, pp. 59-61), could not show favorable errors to be detected more likely than unfavorable errors.

³⁷ See studies by *Hylas/Ashton* (1982), *Kreutzfeldt/Wallace* (1986), *Wright/Ashton* (1989), *Entwistle/Lindsay* (1994), *Bell/Knechel* (1994), *Maletta/Wright* (1996), and *Messier Jr. et al.* (2004), as well as overviews of this research by *Eilifsen/Messier Jr.* (2000, p. 15), and *Caster et al.* (2000, p. 77).

³⁸ See *Loebbecke/Steinbart* (1987, pp. 76 and 87); *Richter* (2005).

³⁹ See *Wright/Mock* (1985, p. 95).

⁴⁰ See *Hatherly* (1980, pp. 38-39) for analytic reasons for this conclusion.

⁴¹ See *Windal* (1961); *Arens* (1970, pp. 109-110); *Hagest* (1975, pp. 43-65); *Knüppe* (1984, pp. 253-260).

version derived from Table A.1, which contains a uniform list of variables ordered by the above categories, is provided in Table 2 below. For each author, it shows both explicit and implicit variables (each marked with an “x”).

	Stettler (1954)	Mautz (1958)	Windel (1961)	Mautz/Sharaf (1961)	Arens (1970)	AAA, Committee on Basic Auditing Concepts (1973)	Kissinger (1974)	Hagest (1975)	Schandl (1978)	Keenan (1979) / Keenan/Anderson (1979)	Hatherly (1980)	Kruppe (1984)	Flint (1988)	Gray (1991)	Barnes (1991)	Caster/Pincus (1996)
source reliability																
independence, integrity, motivation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
ability, qualification, knowledge		x	x		x	x	x	x	x	x	x	x				
production and transmission of evidence																
processes of evidence creation and custody; communication errors			x						x		x		x			
adequacy and effectiveness of controls	x	x	x			x	x	x		x	x		x		x	
directness, steps of evidence transmission	x		x					x	x	x		x		x		
formality of communication				x				x								
characteristics and relation of evidence to the assertion in question																
form, nature, type				x			x	x				x	x			
authenticity and susceptibility to suppression, manipulation, or counterfeiting	x	x	x	x			x	x	x	x	x		x	x		
relevance		x		x	x		x			x	x		x	x	x	
timeliness		x			x		x	x	x			x			x	
representativeness					x		x								x	
closeness, conclusiveness (degree of judgment required)		x	x	x	x		x	x				x	x	x		x
possibility of misinterpretation		x					x						x			
auditor																
qualification, competence, personality	x		x	x		x	x		x				x			
inspiration and sensitivity of recognition													x			
errors and biases in perception						x										
adequate question framing													x			
anticipation of evidence, deviations from expectations																x
combination of several evidence items																
amount of evidence	x						x	x	x				x	x	x	x
dispersion between items of evidence																x
consistency vs. inconsistency of evidence			x	x	x	x	x	x	x		x	x	x	x	x	x

Table 2: Factors affecting the probative value of audit evidence (generic views)

3.2.2.1.2 Source reliability

All authors consider the reliability of the source an important determinant of the probative value of evidence. Most at least refer to the independence, integrity, self-interest, or

motivation of the source, while others deal with the qualifications, competence, or ability as a second dimension of source reliability.⁴²

3.2.2.1.3 Production and transmission of evidence

Most researchers mention that adequate and effective internal controls increase the reliability of “internal evidence” (evidence produced or transmitted by the entity under audit). *Hatherly* stresses the importance of generally assessing the process of evidence generation in order to judge its “quality”⁴³ or probative value. In a similar vein, *Schandl* mentions the way of data acquisition and the conditions under which evidence was prepared as important factors that affect its “truth value”.⁴⁴ Furthermore, he discusses obstacles and errors during the communication process.⁴⁵ Likewise, *Flint*, while arguing for specific types of evidence, considers the care and diligence in the preparation of written evidence and the security of its custody.⁴⁶ *Winald* refers to the effort required by the recipient to process a confirmation request.⁴⁷ All of these factors enhance the probative value of evidence.

Of special interest is a concept offered by *Schandl*, who analyzes the process of generating and communicating information in an abstract manner.⁴⁸ The facts to be proved by the audit, the “principals”, are gone. However, past events may have left traces or “surrogates”, which may be used to draw inferences about the principals. When present, principals may be observed by a person who prepares a surrogate. Surrogates may then be processed, classified, listed, or recorded. This leads to the production of secondary surrogates, and so on. *Schandl* refers to this process as the creation of a “data pyramid”, which is built by layers of surrogates that become more general towards the peak of the pyramid. According to *Schandl*, the “truth value” of the surrogates depends on, among other factors, the “geographical distance” between the surrogate used by the auditor and the ultimate principal. The truth value diminishes with the length of the chain of surrogates, because alterations in content and distortions may occur at every step.

A similar idea is the “route of information transmission” discussed by *Knüppe*.⁴⁹ Related concepts are the “directness”⁵⁰ and the legal distinction between primary, secondary, and circumstantial evidence along with the “best evidence rule” referred to by *Keenan* and *Anderson*.⁵¹ This rule requires the use of the best evidence available. For example, an original document would have precedence over a photocopy. A last variable in this group is the formality of the relevant communication. *Hagest* assumes that information gathered by informal conversation with employees of the audited organization is often of greater reliability than information obtained through official channels.⁵²

3.2.2.1.4 Characteristics and relation of evidence to the assertion in question

Most authors point out that evidence must be relevant or pertinent to the assertion in question to have any probative value. Another factor is the timeliness (or temporal distance) of evidence, meaning how close the evidence is to the period or point of time of the assertion in

⁴² See, e. g., *Kissinger* (1974, p. 90); *Knüppe* (1984, pp. 254-257).

⁴³ See *Hatherly* (1980, pp. 14-16).

⁴⁴ See *Schandl* (1978, p. 138).

⁴⁵ See *Schandl* (1978, pp. 56-68).

⁴⁶ See *Flint* (1988, pp. 108 and 113).

⁴⁷ See *Winald* (1961, pp. 395-397).

⁴⁸ See *Schandl* (1978, pp. 105-108, 125, 139-142, and 207) for the following description.

⁴⁹ See *Knüppe* (1984, pp. 257-258).

⁵⁰ Dealt with, e. g., by *Winald* (1961, p. 395).

⁵¹ See *Keenan* (1979, pp. 96-97); *Keenan/Anderson* (1979, p. 119).

⁵² See *Hagest* (1975, pp. 56-57).

question.⁵³ Furthermore, the probative value of evidence depends on whether it is representative of the assertion in question or whether it relates only to specific instances and therefore does not cover the assertion entirely.⁵⁴ To some authors, the nature, type, or form of evidence is directly relevant to the probative value of evidence.⁵⁵ This variable is the most extensively analyzed, as the peculiarities of specific evidence types is the issue for the substantive views.⁵⁶

Another factor in this category is the authenticity or genuineness of the evidence. If it has been altered or distorted, the probative value would be diminished. However, most authors do not refer to actual alteration, but rather to the susceptibility of the evidence type to alteration, manipulation, fraud, counterfeiting, or suppression.⁵⁷ Finally, the conclusiveness of the evidence is discussed, i. e. the degree of judgment required to draw an inference from the evidence regarding the truth of the assertion in question. This judgment may be coupled with the danger of misinterpretation.⁵⁸ Similar to this variable are the concepts of “logical distance” by *Hagest*, “congruence of content” by *Knüppe*, “closeness” by *Gray*, and “directness” by *Caster/Pincus*.⁵⁹

3.2.2.1.5 Auditor

The qualifications and competence (experience, knowledge) of the auditor are important, as they allow the auditor to draw inferences about the truth of the assertion in question based on the evidence.⁶⁰ *Mautz/Sharaf* describe the requirement of professional skepticism in evidence evaluation.⁶¹ *Flint* points out the importance of proper question framing by the auditor in order to avoid misunderstandings, responses with intent to deceive, or other defects common to oral evidence.⁶² Additionally, he refers to an “apparently inspirational element in audit enquiry by which the mind of an experienced auditor develops acute sensitivity to recognition of the abnormal or unexpected which is highly relevant to an opinion on the audited propositions.”⁶³ This element, in conjunction with a high degree of knowledge, skill, and experience, has “an indispensable and invaluable part to play in identifying the uniquely relevant evidence”⁶⁴.

The AAA’s *Committee on Basic Auditing Concepts* discusses possible errors and biases in auditor perception and observation, as well as means for reducing these deficiencies.⁶⁵ Finally, *Caster/Pincus* identify anticipation of evidence as a factor that influences the perception of the probative value of evidence. In particular, unanticipated evidence is perceived to be less persuasive.⁶⁶

⁵³ See, e. g., *Arens* (1970, pp. 123-124); *Kissinger* (1974, p. 94); *Hagest* (1975, pp. 47-50); *Schandl* (1978, pp. 140 and 151); *Knüppe* (1984, pp. 254).

⁵⁴ See *Kissinger* (1974, pp. 96-101); *Barnes* (1991, p. 54).

⁵⁵ See, e. g., *Hagest* (1975, pp. 51-57); *Knüppe* (1984, pp. 258-259).

⁵⁶ See section 3.2.1.

⁵⁷ See, e. g., *Windal* (1961, p. 395); *Kissinger* (1974, p. 90).

⁵⁸ See, e. g., *Mautz* (1958, pp. 44-45); *Windal* (1961, p. 395); *Arens* (1970, p. 109); *Kissinger* (1974, pp. 89-90).

⁵⁹ See *Hagest* (1975, pp. 44-47); *Knüppe* (1984, p. 253); *Gray* (1991, pp. 132-133); *Caster/Pincus* (1996, pp. 6-7).

⁶⁰ See *Windal* (1961, p. 395); AAA, *Committee on Basic Auditing Concepts* (1973, pp. 17 and 40); *Kissinger* (1974, pp. 89-90); *Schandl* (1978, pp. 135-136 and 188-191).

⁶¹ See *Mautz/Sharaf* (1961, pp. 117, 120, and 122-123).

⁶² See *Flint* (1988, p. 113).

⁶³ *Flint* (1988, p. 114).

⁶⁴ *Flint* (1988, p. 115).

⁶⁵ See AAA, *Committee on Basic Auditing Concepts* (1973, pp. 28-34).

⁶⁶ See *Caster/Pincus* (1996, p. 7).

3.2.2.1.6 Combination of several items of evidence

The probative value of evidence, as a whole, may increase by increasing the number of evidence items, i. e. by increasing the quantity and completeness of evidence. The value may also increase by having corroborative evidence from independent sources or having multiple different evidence types. In these cases, the probative value of the evidence set may exceed the sum of the probative values of the items considered individually.⁶⁷ Inconsistent evidence leads to a “loss” of probative value greater than the mere “net effect” of the conflicting evidence items.⁶⁸ Additional evidence is usually required to resolve inconsistencies.

3.2.2.2 Empirical research

3.2.2.2.1 Explicit research on the probative value of audit evidence

To date, generic view research on the probative value of audit evidence has been almost exclusively conceptual in nature. The study by *Caster/Pincus* is an exception.⁶⁹ Referring back to *Bentham's* (1827) theory of the persuasiveness of evidence, the authors proposed and tested experimentally six hypotheses. They found that the persuasive value perceived by the participants (senior auditors) increased when the number of relevant, non-redundant tests increased, when evidence was provided by an independent party and not by client personnel, when evidence was more direct (provided by substantive tests of details, not by analytical review), or when evidence conformed to expectations. Furthermore, sets of several items of evidence were deemed more persuasive when the sets became more one-sided in their composition or when the estimates in the set became less disperse.⁷⁰

3.2.2.2.2 Relevant research not explicitly addressing the probative value of audit evidence

There is additional empirical research that is relevant to the topic. This research usually does not refer to the probative value of evidence as outlined in this paper, but deals with specific aspects of auditors' information usage and processing behavior. In particular, a considerable amount of research was dedicated to auditors' assessment of information sources and the information they provide. The sources investigated to date include representatives from client management, the client's internal audit department, various external (third party) sources, other members of the audit team, and written or technical decision aids. Most studies found that auditors placed more reliance on information from sources judged more reliable, more competent, and/or of higher integrity,⁷¹ although some studies revealed that auditors did not sufficiently consider the reliability of their sources.^{72,73}

⁶⁷ See, e. g., *Mautz/Sharaf* (1961, pp. 118-120); *AAA, Committee on Basic Auditing Concepts* (1973, p. 41); *Kissinger* (1974, pp. 101-104); *Hagest* (1975, pp. 58-65); *Schandl* (1978, pp. 137, 141, 143, and 208-210); *Hatherly* (1980, pp. 17-24); *Flint* (1988, pp. 108-109); *Gray* (1991, pp. 132 and 135-136); *Barnes* (1991, pp. 54-55); *Caster/Pincus* (1996, pp. 4-6).

⁶⁸ See *Hatherly* (1980, pp. 21-22).

⁶⁹ See *Caster/Pincus* (1996, also included in the Tables 2 and A.1).

⁷⁰ See *Caster/Pincus* (1996, pp. 12-14).

⁷¹ See *Rebele et al.* (1988, pp. 47-48 and 50); *Hirst* (1994, pp. 120-121 and 124-125); *Anderson et al.* (1994, pp. 141 and 145-146); *Margheim* (1986, pp. 200-203); *Goodwin/Trotman* (1996, pp. 163-167); *Qureshi* (1993, pp. 138-143); *Charitable* (1996, pp. 85-86); *Patel* (2001, pp. 12-13, 23, and 27); *Beaulieu* (2001, pp. 94-97); *Peecher* (1996, p. 133); *Goodwin* (1999, p. 9); *Anderson et al.* (2003, pp. 6-7); *Kadous et al.* (2003, p. 23); *Anderson et al.* (2004, pp. 18-24); *Glover et al.* (2005, p. 15-16); *Haynes* (1993, pp. 69, 100-103, and 123-124); *Abdel-khalik et al.* (1983, pp. 218-219 and 223-224); *Knechel/Messier Jr.* (1990, pp. 388-389 and 397-401); *Washington* (1987); *Bamber* (1983, pp. 405-408 and 410-411).

⁷² See *Joyce/Biddle* (1981, pp. 340-341); *Reisch* (1997, pp. 95 and 132); *Margheim* (1986, pp. 200-203); *Myers* (1995, pp. 20-25, 40-41, and 44-49); *Peterson* (1994, pp. 96-97, 112, 147-149, and 166-167).

Though the production and transmission of evidence is closely related to factors affecting information sources, empirical research on this topic has focused on the assessment of and reliance on the firm's internal audit and controls by the auditor.⁷⁴ Competence, objectivity (usually measured by organizational status), and performance of internal auditors were identified as factors affecting auditors on this decision.⁷⁵

There are also empirical results regarding characteristics of evidence and the evidence's relation to the assertion in question, especially regarding information relevance. Research on the so-called "dilution effect" revealed that relevant information is used less if irrelevant information is available.⁷⁶ Other studies showed that more experienced auditors were better able to recognize relevant information and concentrated better on using only this information.⁷⁷ However, *Shanteau* refers to results that reveal that judgments by both novices and experts were influenced by irrelevant information.⁷⁸ In a study by *Bonner*, experienced auditors from one of two participating firms erroneously judged irrelevant information to be relevant.⁷⁹ Finally, *Matson* found that auditors rated irrelevant information as more important when they were held accountable for their responses.⁸⁰

Kissinger investigated the factor "timeliness" in an analysis of auditors' working papers.⁸¹ He found that auditors preferred acquiring evidence (substantive tests of details and confirmations of accounts receivable) at the "correct" point of time, usually the end of the financial year. Investigation of the representativeness of audit evidence to date has been limited to confirmations of accounts receivable.⁸² The last factor in this group that was studied empirically is the closeness of evidence to the assertion in question.⁸³

Empirical research relevant to the combination of items of evidence was also conducted. The effects of evidence amount and the dispersion of estimates among several pieces were studied by *Caster/Pincus*.⁸⁴ Concerning consistency among several items of evidence, *Moeckel* found that auditors committed errors when integrating evidence to form a global judgment.⁸⁵ In particular, contradictions between different items of evidence remained undetected. In part, this result was attributable to memory reconstruction errors. On the other hand, various studies showed that auditors normally do consider the consistency between several items of

⁷³ A more detailed discussion of auditors' assessment of source reliability and information received from the sources will be provided in another paper.

⁷⁴ See *Krishnamoorthy* (2002) for an overview.

⁷⁵ See *Krishnamoorthy* (2002).

⁷⁶ See *Hackenbrack* (1992, pp. 133-135); *Hoffman/Patton* (1997, pp. 233-234); *Glover* (1997, p. 222); *Glover* (1994, pp. 49-52, 56, and 79-80); *Shelton* (1999, pp. 222-223). *Shelton* found dilution for seniors only, but not for managers or partners.

⁷⁷ See *Davis* (1996, pp. 20-21, 28-29, and 31); *Bédard/Mock* (1992, pp. 5, 10-13, and 15-16); *Shafer* (1994, pp. 103-130); *Comstock* (1991, pp. 50 and 75); in part (for auditors from one of two participating firms) *Bonner* (1990, pp. 78, 82-84, and 88). For further results see *Bédard/Chi* (1993, pp. 28-29). In a tax-related context, *Magro* (2003) found both tax experts and students to adequately consider directly relevant information from different tax-authorities for the decision of a specific estate tax issue. However, in contrast to the experts, the students apparently did not distinguish between indirectly relevant and irrelevant information. Additionally, the students either did not recognize irrelevance or they were unable to ignore irrelevant evidence when forming their judgment.

⁷⁸ See *Shanteau* (1993, p. 53).

⁷⁹ See *Bonner* (1990, pp. 80-81, 83, and 88).

⁸⁰ See *Matson* (1997, pp. 54 and 63; 2003, pp. 17 and 19).

⁸¹ See *Kissinger* (1974, pp. 251-258, 293, and 312-313).

⁸² See section 3.2.1.2 above. For empirical research concerning specific types of evidence see the same section.

⁸³ See the study by *Caster/Pincus* (1996) that was presented above (section 3.2.2.2.1). *Caster/Pincus* call this variable "directness".

⁸⁴ See *Caster/Pincus* (1996, presented above, section 3.2.2.2.1).

⁸⁵ See *Moeckel* (1990, pp. 380-382; 1991, pp. 285 and 287-290).

evidence when assessing their probative value.⁸⁶ Interestingly, *Knechel/Messier Jr.* found that corroborative evidence received later did not influence the auditors' assessments of corroborated evidence received earlier.⁸⁷ Moreover, recency effects have been detected in sequential evaluation of inconsistent evidence by auditors.⁸⁸ Finally, some authors observed confirmation effects where evidence consistent with expectations was overvalued and inconsistent evidence was undervalued,⁸⁹ while other authors did not find this or even found that auditors put more weight on evidence that opposed expectations.⁹⁰

3.2.3 Some remarks on the line of research

Analytical research on the probative value of audit evidence conducted to date has been summarized in this section. Especially in works published in the 1950s-70s, substantive views on audit evidence played a significant role. Although substantive views may help to form an understanding of the probative value of certain evidence types, these views alone are not an adequate starting point for the development of a theory. A theory requires generalization and abstraction, so it is important to focus on *general* factors relevant to probative value, *independent* of specific evidence types. These general factors are for what generic views look. While some researchers explicitly list criteria or variables that influence the probative value, others leave such criteria implicit, particularly in analyses that follow substantive views.

The criteria identified in articles on the probative value of audit evidence have been collected and presented in a comparative overview, arranged in five groups. This consolidation and structuring of existing findings serves as a starting point for further research, which in the long run should lead to the development of a theory. The next step in this process is to integrate the relevant variables into a conceptual model (see section 4 for a proposal). Also, empirical support for the influence of the variables is needed. Up to now, aside from empirical research on the reliability of confirmations and analytic procedures as two specific *types* of evidence, only *Caster/Pincus* have advanced an empirical study on *general* determinants of the probative value of audit evidence.⁹¹ However, there is empirical research on several variables summarized above that is relevant, without explicitly addressing the issue of probative value.

3.3 Formal approaches

3.3.1 The approach by *Toba/Kissinger/Gibbs* and *Smieliauskas/Smith*

Formal approaches represent another important line of research concerning the probative value of audit evidence. The first contributions using formalizations to a considerable extent were the articles presented by *Toba, Kissinger, and Gibbs*.⁹² The approach was first advanced by *Toba* and then refined and extended by *Kissinger* and *Gibbs*. It focuses on the relationship between concepts of evidence and the propositions to be proved in a financial statement audit.

⁸⁶ See *Caster/Pincus* (1996, pp. 5-6 and 12-13); *Anderson et al.* (1995, pp. 29-33); *Goodwin* (1999, pp. 9-10 and 13); *Hirst/Koonce* (1996, pp. 471-474).

⁸⁷ See *Knechel/Messier Jr.* (1990, pp. 397 and 402-403).

⁸⁸ See, e. g., *Ashton/Ashton* (1988, pp. 633-639); *Tubbs et al.* (1990, pp. 458-459); *Asare* (1992, pp. 388-391); *Messier Jr./Tubbs* (1994, pp. 64-67); *Reisch* (1997, pp. 83, 96, and 130); *Arnold et al.* (2000, pp. 117-120, 124-126, and 128-129); *Patel* (2001, pp. 21-23 and 25-28); *Hansen* (1993, pp. 101-103); *Pei et al.* (1992, pp. 177-179 and 181).

⁸⁹ See results by *Asare et al.* (1998); *Bamber et al.* (1997, pp. 261-263); *Choo* (1993, pp. 105-108 and 120); *Church* (1991, pp. 523-528); *Earley* (2002, pp. 607-609).

⁹⁰ See *Smith/Kida* (1991, pp. 483-484); *Ashton/Ashton* (1988, pp. 637-639); *Asare* (1992, p. 391); *Reckers/Schultz Jr.* (1993, pp. 138-140); *Kerr/Ward* (1994, p. 34); *Coulter* (1994, pp. 73-90 and 119-121).

⁹¹ See *Caster/Pincus* (1996, presented above, section 3.2.2.2.1).

⁹² See *Toba* (1975, 1977, and 1980); *Kissinger* (1977); *Gibbs* (1977). In his dissertation, *Kissinger* (1974) also worked with formalizations.

The process of splitting up the ultimate proposition (“fair presentation”) into a number of elementary propositions that must be supported by evidence is described. The formalization is based on a distinction between confirming and supporting evidence, each defined by formulas using conditional probabilities. The approach is normative in nature, as it deals with the support (or probative value) *required* for proving elementary propositions and finally the ultimate proposition. However, nothing is said about how to assess the probative value of audit evidence or which factors should influence this assessment. An empirical study by *Stephens* revealed little conformity between actual auditor judgments and the judgments prescribed by the normative model.⁹³ The approach was later extended by *Smieliauskas/Smith*.⁹⁴ In particular, these authors require an explanatory link between evidence and the assertion for the assertion to be confirmed by evidence. Besides this specific aspect, no hints are provided on how the actual probative value of evidence should be judged.

3.3.2 Models for aggregating the probative value of evidence

Considerable research has been dedicated to formal models for aggregating the probative values of single items of evidence to form an overall value. These approaches are normative in nature and usually consist of three sequential steps: (1) explaining the structure and interdependencies between evidence and assertions, (2) quantifying the probative value of pieces of evidence, and (3) aggregating these values by applying mathematical concepts and algorithms.⁹⁵ Simple conditional probabilities can be aggregated by applying *Bayes’s* theorem in its basic form; though there are some conceptual deficiencies.⁹⁶ Therefore, more elaborate models are based on likelihood ratios⁹⁷ or belief functions⁹⁸. To better account for uncertainty in evidence evaluation, fuzzy set theory could be applied.⁹⁹ However, elaborate models for evidence aggregation using fuzzy set theory have not yet been advanced.

Boritz/Wensley and *Gillett* have developed expert systems that contain procedures for aggregating audit evidence.¹⁰⁰ Just as with the models mentioned earlier, these systems do not provide any method for evaluating the probative values of the individual items of evidence. Rather, they require that these values are judged subjectively by the auditor or by independent experts to provide the knowledge base for the expert systems. Despite this common problem of all formal models presented to date, empirical research shows that the application of these (normative) models can significantly improve the quantitative *aggregation* process of evidence.¹⁰¹

Finally, *Hogarth/Einhorn’s*¹⁰² belief adjustment model was applied by several researchers in the context of an audit. In contrast to the models presented before, it is a descriptive model of evidence aggregation. A specific application is order effect prediction.¹⁰³ The descriptive

⁹³ See *Stephens* (1983).

⁹⁴ See *Smieliauskas/Smith* (1990).

⁹⁵ See *Holstrum/Mock* (1985, p. 102).

⁹⁶ See *Akresh et al.* (1988, p. 46); *Srivastava/Shafer* (1992, p. 252); *Dutta/Srivastava* (1993, p. 138).

⁹⁷ See *Dutta/Srivastava* (1993); *Dutta* (1991); *Schum* (1989 and 1994); *Mock et al.* (1997); *Krishnamoorthy et al.* (1999).

⁹⁸ See *Srivastava/Shafer* (1992); *Shafer/Srivastava* (1990); *Dutta* (1991); *Dutta et al.* (1998); *Gillett* (1996); *Srivastava/Mock* (2000a, 2000b, and 2002); *Krishnamoorthy et al.* (1999).

⁹⁹ For a simple example see *Siegel et al.* (1995). For an introduction to the theory see *de Korvin* (1995); *Zebda* (1995 and 1998); *Schum* (1994), pp. 261-269.

¹⁰⁰ See *Boritz/Wensley* (1990); *Gillett* (1993).

¹⁰¹ See *Krishnamoorthy et al.* (1999); *Srinidhi/Vasarhelyi* (1986); *Schum/Martin* (1982), although this last study had students as participants in a legal evidence evaluation task.

¹⁰² See *Hogarth/Einhorn* (1992).

¹⁰³ See section 3.2.2.2.

validity of the model is supported by several empirical studies.¹⁰⁴ Again, the model does not address which variables affect the perception of individual items' probative value.

4. Closing remarks, an integrated conceptual framework, and avenues for future research

Some authors have supposed that there would already be a “general theory” of audit evidence. For example, this is suggested by the title of *Toba's* article (“A General Theory of Evidence as the Conceptual Foundation in Auditing Theory”¹⁰⁵) and stated explicitly by *Srivastava*: “[...] general theories of evidence do exist in auditing and outside auditing too.”¹⁰⁶ *Srivastava's* statement opposes *Caster/Pincus's* view that “to date, no general theory of audit evidence has been accepted in either the research or practice literature.”¹⁰⁷ Both views are correct. *Srivastava* is right because flexible and mathematically complete models for aggregating the probative value *do* exist. *Caster/Pincus* are also right because these existing and well-founded models only cover one, although very important, aspect – namely evidence aggregation. None of these models provides assistance on how to quantify the probative value of individual items of evidence; all refer to the auditor's professional judgment. However, a *general* theory for the probative value would need to also address the variables that affect the probative value of single items of evidence. A comprehensive theory of this kind has not yet been presented – neither in auditing, nor in jurisprudence as a related field.¹⁰⁸

Formal models for evidence aggregation have the advantage of appearing objective to the extent that they are based on “mathematical truths”. As mentioned in section 3.3.2, empirical results support the view that evidence aggregation is more accurate than personal judgment alone when assisted by such formal models. So for evidence aggregation, formal models have a very important function. But obviously, objectivity is strongly limited because the starting values that the models process are entirely based on the auditor's subjective judgment. The quantification of individual evidence items' probative value cannot be derived formally. So it must be looked to conceptual and empirical research to provide insight into which variables to consider when evaluating audit evidence's probative value.

Research conducted in this area was summarized in section 3.2. Notably, after emerging in the 1950s, numerous contributions were made especially during the 1960s and 70s. Though, with the emergence of formal models, the analytical and conceptual research was largely abandoned without the development of a comprehensive and integrative theory. Research in this area should be resumed and extended in order to develop and empirically test such a theory. Generic views are the most promising approaches for achieving this goal.¹⁰⁹ As mentioned in the introduction, the importance of understanding the variables that affect the probative value of audit evidence has increased, not least owing to recently revised professional standards requiring the auditor to responsibly and critically evaluate evidence and to consider the possibility of fraud.

Contributions that largely existed in isolation were grouped and consolidated, in order to structure variables that influence the probative value of audit evidence that have been identified to date. To combine these findings with the previously mentioned auditor's “recognition-of-reality-problem” and the role of persuasive audit evidence to solve this

¹⁰⁴ See *Bamber et al.* (1997); *Krishnamoorthy et al.* (1999); *Reisch* (1997, pp. 83, 96, and 130); *Ashton/Kennedy* (2002, pp. 222-223).

¹⁰⁵ *Toba* (1975, p. 7).

¹⁰⁶ *Srivastava* (1996, p. 23).

¹⁰⁷ *Caster/Pincus* (1996, p. 1).

¹⁰⁸ See *Gronewold* (2005, pp. 102-126), for a review of legal research on the probative value of evidence.

¹⁰⁹ See section 3.2.2.

problem, a conceptual framework of audit evidence's probative value was created (see Figure 3):

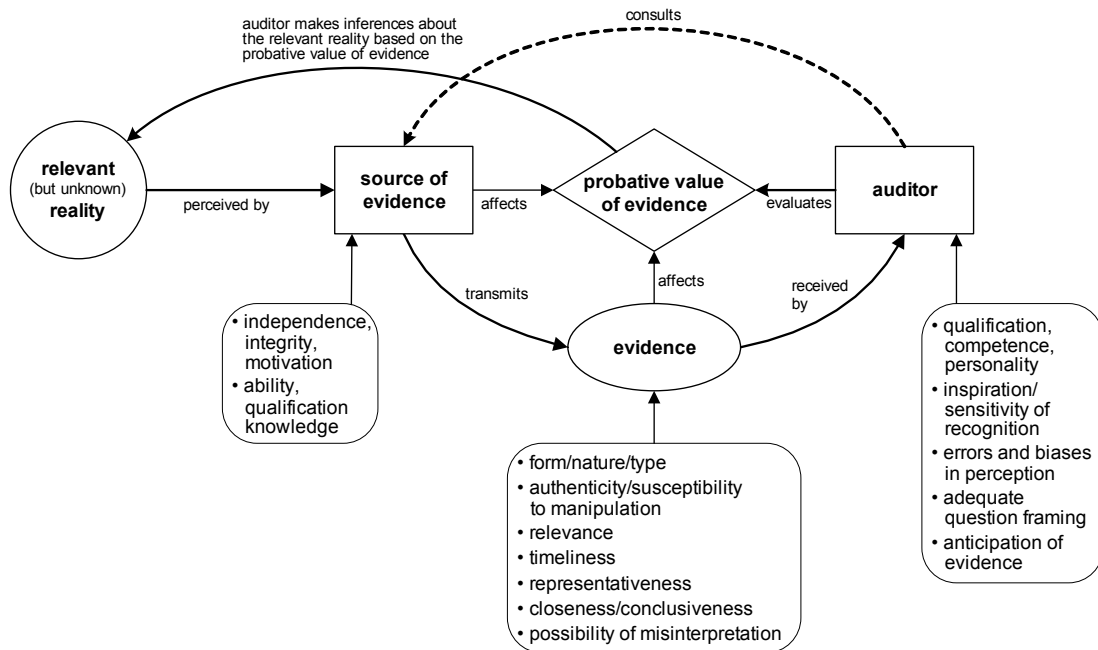


Figure 3: Integrated conceptual framework of variables affecting the probative value of audit evidence (single item of evidence)

The audit's starting point is the relevant reality asserted in the financial statements or, more generally, the reality underlying the assertions to be verified. This reality may be observed, memorized, and/or documented by persons or institutions. Later, during the audit, the auditor may consult these sources in order to obtain evidence from them. The auditor evaluates the evidence's probative value considering the source's reliability, characteristics of the evidence itself, and the process of its creation and transmission (as far as the auditor can possibly determine). For properly evaluating evidence and drawing correct conclusions about the reality in question, factors such as the qualifications and knowledge of the auditor, including perception, recognition skills, inspiration, intuition, an adequate question framing, and, more generally, an adequate behavior when consulting sources, are important. When the auditor obtains more than one piece of evidence, each item will be judged using the above factors. The individual probative values will be aggregated to create an overall value that considers the amount of evidence and the consistency or inconsistency between the individual items. This process could be assisted by formal models like the ones mentioned in section 3.3.2. In Figure 4, the framework is illustrated using a case where two items of evidence are relevant to the reality in question:

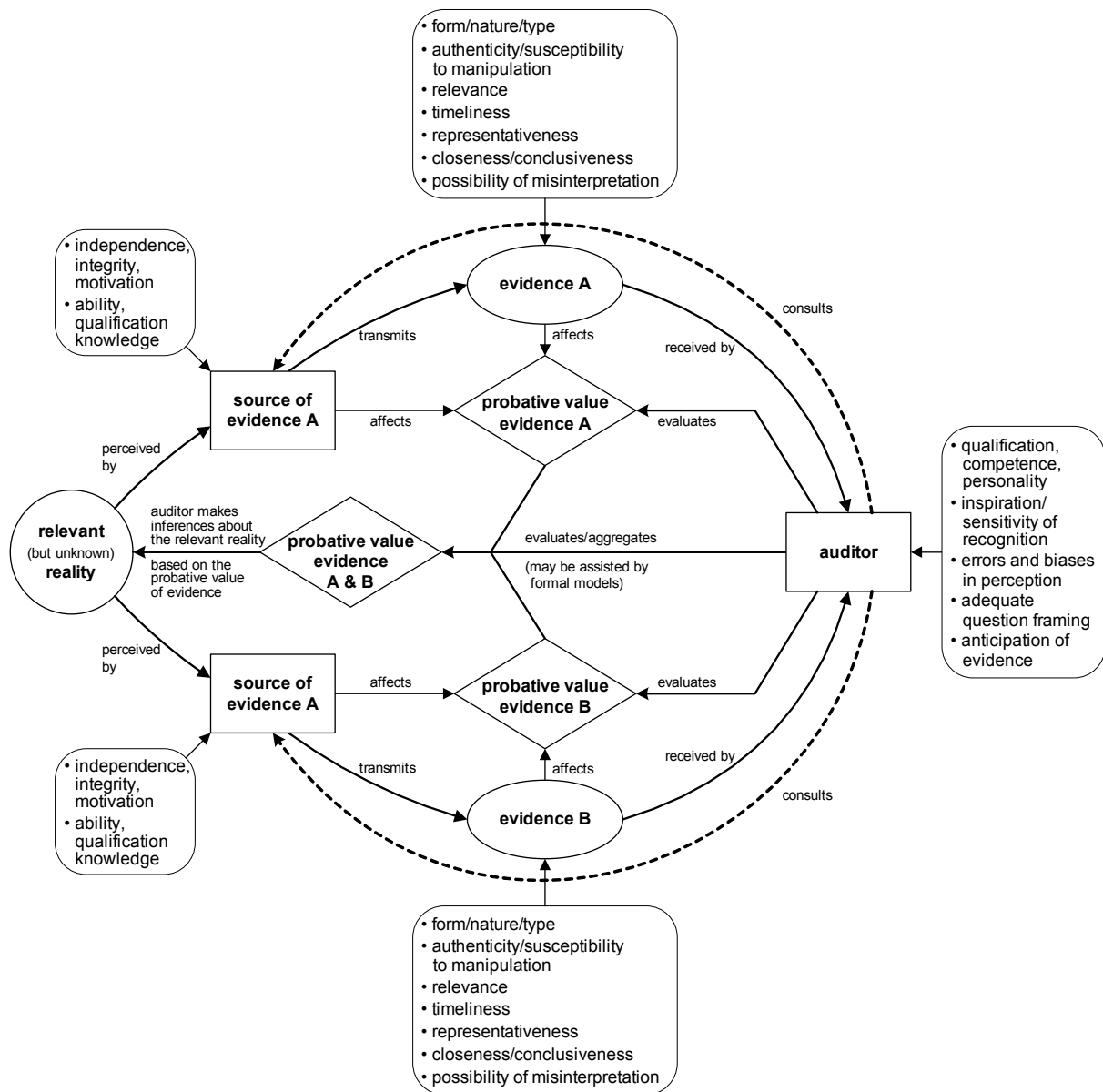


Figure 4: Integrated conceptual framework of variables affecting the probative value of audit evidence

The framework described above structures the variables relevant to the probative value of audit evidence and helps to visualize the relationships between them. Future research should be conducted in both the conceptual and empirical areas. Conceptual research may extend, refine, or replace the model presented here. For example, additional characteristics of evidence relevant to the probative value may be identified and these variables, as well as the ones included in the framework, should be analyzed in greater depth. Also, how sources process evidence should be analyzed in a more detailed manner than it was done up to now, in order to understand the processes by which evidence is created, altered, or counterfeited. These processes are essential for the probative value and must play a central role within a theory of the probative value of audit evidence. Considering findings in psychology and jurisprudence may assist developments in this area. For example, findings concerning information processing, witness behavior, and the credibility of testimony could be helpful. Furthermore, the relationship between proper auditor behavior (for instance, adequate question framing), and the probative value of the evidence received (answers given by witnesses) is an important field for investigation.

The framework can also be used as a guideline for an analytical evaluation of specific types of audit evidence. Early analyses of this kind (see section 3.2.1.1) often left the criteria implicit, and therefore their comparability is limited. In contrast, a more complete and refined general framework like the one presented above with the criteria defined in advance promises useful and comparable results. Moreover, the results of relevant empirical research already completed can add value to such an analysis. This could lead to a ranking of the relative probative value of different evidence types or of the corresponding audit procedures, as was called for by *Caster et al.*¹¹⁰

Empirical research should serve at least two purposes. First, the reliability of evidence types besides the ones investigated to date (confirmations and analytic procedures, see section 3.2.1.2) can be studied, which would extend the empirical basis for elaborating the just mentioned ranking. Second, empirical research is needed for backing the significance and role of the variables included in the above conceptual model. Aside from relevant empirical results for selected variables in studies that did not explicitly address the probative value of audit evidence, to date, the only empirical study explicitly related to the topic is by *Caster/Pincus*.¹¹¹ More research along this line is necessary, i. e. experimental studies that ask auditors to assess the probative value of certain evidence items that have experimentally manipulated characteristics. Moreover, information transmission routes or characteristics of evidence sources should be varied, which has not been done by *Caster/Pincus*. Although this method provides insight into how auditors *perceive* or *evaluate* the probative value of evidence, measuring the “objective” probative value of evidence is not possible.¹¹² Therefore, experimental studies are the most important avenue for future research, because they will provide empirical support to the model or indicate where revisions and adjustments are necessary. As outlined here, empirical and conceptual research should go hand-in-hand to achieve the development of a theory, which *in conjunction* with the existing, well-founded, and elaborate formal approaches might deserve to be called “a general theory of the probative value of audit evidence”.

¹¹⁰ See *Caster et al.* (2000, p. 85).

¹¹¹ See *Caster/Pincus* (1996, presented above, section 3.2.2.2.1).

¹¹² There are no external criteria for validation that allow determining the true status of evidence regarding the fact to be proved. This is just the core of the problem – if such criteria existed, assessing the probative value of evidence would not be a problem at all.

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Appendix

	Stettler (1954)	Mautz (1958)	Windel (1961)	Mautz/Sharaf (1961)	Arens (1970)	AAA, Committee on Basic Auditing Concepts (1973)	Kissinger (1974)	Hagest (1975)
factors referring to the source of evidence	independence of source *)	responsibility, integrity, bias, or self-interest of the one testifying *)	independence of source	independence of source *)	independence of source	independence of source	responsibility, integrity, bias, or self-interest of evidential source	independence of source; motivation to manipulation or false testimony *)
		knowledge of the one testifying *)	maintenance of formal accounting records; public/personal responsibility by the source effort required to handle confirmation request		qualification of source	competence of source (training, experience, responsibility)	qualifications (knowledge) of evidential source	ability of source *)
factors referring to the production and transmission of evidence	adequacy of internal controls *)	adequacy of internal controls *)	adequacy of internal control			adequacy of internal control *)	adequacy of internal control	adequacy of internal controls *)
	directness of information transmission *)		directness of evidence acquisition	formality of communication *)				directness of information transmission *)
characteristics of evidence and factors referring to the relation of evidence to the assertion in question	authenticity; ease of counterfeiting *)	possibility of manipulation or falsification *)	susceptibility to fraud	nature/type *)			type of evidence	form **)
		pertinence to question, at issue		genuineness *)	relevance ***)		susceptibility to suppression, manipulation, alteration, or counterfeiting	relevance
		timeliness *)		pertinence to subject matter *)	timeliness ***)		timeliness	timeliness
					size and variance of population; expected error rate ***)		statistical parameters of population underlying the assertion in question (size, variance, rate of error)	temporal distance between production of an information and its usage as evidence
		conclusiveness	objectivity/requirement of judgment	conclusiveness *)	requirement of judgment		conclusiveness; degree of judgment required	logical distance (directness of relation between evidence and assertion to be proved)
factors referring to the auditor as evaluator of evidence	qualification of the auditor *)	possibility of misinterpretation	qualification of the auditor	personality of auditor (experience, analytic skills, skepticism *)		competence of the auditor (experience and knowledge) errors and biases in auditor perception *)	possibility of misinterpretation	
							qualification of the auditor	
factors referring to the combination of several evidence items	adequate amount of evidence *)						adequate number of evidence items of different types	sufficient quantity of evidence
			conjunction effect of several audit techniques providing consistent evidence	combinaive effect of different types of evidence	corroborative evidence ***)	existence of corroborative evidence from multiple and mutually independent sources	existence of corroborative evidence of different types	combinaive effect of evidence from qualitatively different classes

*) Not stated explicitly as general determinant of audit evidence's probative value, but implicitly, or considered only for specific types of evidence.

**) Hagest differentiates between physical observation, documents, and inquiries. As generic term for this distinction, he does not use "form" ("Form"), but "source" ("Quelle"). However, in order to avoid misunderstandings, here the term "source" is used exclusively for individuals or institutions from which evidence is produced or transmitted.

***) Discussed by Arens as a variable that affects evidence accumulation, but not explicitly as a variable that affects the probative value of evidence.

Table A.1: Synopsis of factors affecting the probative value of audit evidence (generic views)

Schandl (1978)	Keenan (1979) / Keenan/Anderson (1979)	Hatherly (1980)	Kruppie (1984)	Flint (1988)	Gray (1991)	Barnes (1991)	Caster/Phocas (1996)
motives and goals of source	independence and motivation of source	independence, integrity, and motive of source *)	trustworthiness of source independence and self-interest of source	reliability of source independence, integrity, and interest of source; intent to deceive	reliability of source independence of source	source credibility	source reliability independence of source
qualification of source	ability of source	ability of source *)	qualification of source				
way of data acquisition by the source; conditions under which surrogate (evidence) was prepared; communication errors	processes of creation and generation of evidence			care and diligence of preparation; security of arrangements for custody			
adequacy of internal controls	adequacy and effectiveness of internal controls *)			effectiveness of controls *)		adequacy of internal controls	
geographical distance (steps in information transmission)	directness (primary vs. secondary vs. circumstantial evidence)		route of information transmission (number of steps)		directness (primary vs. secondary vs. circumstantial evidence)		
susceptibility to distortion	possibility of alteration or failure *)	susceptibility to manipulation *)	form	nature of evidence authenticity	susceptibility to manipulation *)		
temporal distance between surrogate (evidence) and ultimate principal (fact in question)	relevance	relevance *)	temporal congruence between the evidence and the point/period of time in question	pertinence	relevance	relevance	
						timeliness	
						representativeness of evidence for assertion in question	
							directness (steps of reasoning required between evidence and issue in question)
experience, knowledge, and mental situation of the auditor				degree of subjectivity	closeness of evidence to the thing being evidenced (as determined by the type of evidence)		
				danger of misunderstanding			
				advanced knowledge, skill, and experience			
				inspiration and sensitivity of recognition by the auditor			
				adequate question framing by the auditor		reasoning errors by the auditor	
							anticipation of evidence; deviations from expectations
adequate number of surrogates (items of evidence)			sufficiency of evidence	sufficiency of evidence	sufficient quantity of evidence	completeness of evidence	amount of evidence
stereo/confirmation effect of consistent surrogates (items of evidence) from independent sources	synergy effect or diminishing marginal effect of consistent evidence; inconsistency effect of inconsistent evidence		existence of corroborative evidence obtained independently from each other	combinaive effect of evidence of varied nature and from different sources	existence of corroborative evidence from independent sources	cumulative effect of corroborating evidence from different sources and of different types	dispersion between items of evidence consistency among items of evidence (one-sidedness)

*) Not stated explicitly as general determinant of audit evidence's probative value, but implicitly, or considered only for specific types of evidence.

Table A.1 (continued): Synopsis of factors affecting the probative value of audit evidence (generic views)