Mediumship and Stylometry

Exploring a New Way of Attributing Authorship to Mediumistic Writings

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Abstract – Stylometry is still largely unexplored for applications in attributing authorship to mediumistic writings, as outlined in the subsequent literature review. Stylometry is a statistical method for analyzing authorship with a history to detect anonymous authors, e. g., J. K. Rowling as the real author of *The Cuckoo's Calling*. Modern stylometry transcends literature analysis, applying to forensic inquiries, such as plagiarism detection, online security, and group identity characteristics. Historically, stylometric research unfolds in three phases: focusing on single numerical functions, statistical methods based on word frequencies, and contemporary use of machine learning. Authorship analysis includes three primary objectives: authorship attribution, verification, and characterization. It uses mathematical linguistics, information theory, and linguistic features like vocabulary richness, word frequency, and syntactic structures. Stylometric methods reliably detect authorship in imitation scenarios (pastiche) and have now also led to adversarial stylometry, which facilitates and identifies attempts at anonymization. Distribution patterns of features such as function words or punctuation can only be detected with high computing power and appear to contain too little content or emotion to be recognized by psi abilities of mediums. Imitation on a stylometric level has not yet been achieved by professional writers and does not appear to be one of the abilities of savants either, whose left hemisphere, including speech and language, is the least developed, which is why such genuine talent cannot be assumed in mediums either. Due to its undeniable successes, its quantitative and computational approach, and its potential to investigate a wide range of research questions, stylometry therefore appears to be a desirable auxiliary science for mediumship research.

Keywords: introduction to stylometry – mediumship research – living-agent psi – survival psi – savant syndrome

Mediumismus und Stilometrie: Erkundung eines Neuen Weges zur Zuordnung der Autorschaft von mediumistischen Schriften

Zusammenfassung[2] – Der Einsatz von Stilometrie zur Zuordnung der Urheberschaft von mediumistischen Schriften ist noch weitgehend unerforscht und bedarf weiterer Untersuchungen, wie in der vorliegenden Literaturübersicht dargelegt. Stilometrie ist eine quantitative, computergestützte Methode der Urheberschaftsanalyse, die in der Vergangenheit erfolgreich verwendet wurde, um anonyme Autoren aufzuspüren, wie z. B. J. K. Rowling als wahre Autorin von *The Cuckoo's Calling*. Die moderne Stilometrie geht über die literarische Analyse hinaus und wird bei forensischen Untersuchungen wie der Aufdeckung von Plagiaten, Erhöhung der Online-Sicherheit und Identifikation von Gruppenidentitäten eingesetzt. Historisch gesehen hat sich die stilometrische Forschung in drei Phasen entwickelt: Der Schwerpunkt lag zuerst auf einzelnen numerischen Merkmalen, später auf statistischen Methoden nach Maßgabe von Worthäufigkeiten und heute auf maschinellem Lernen. Die Urheberschaftsanalyse verfolgt drei Hauptziele: Zuweisung (attribution), Überprüfung (verification) und Charakterisierung (profiling) der Autorschaft. Sie nutzt die mathematische Linguistik, die Informationstheorie und linguistische Merkmale wie Wortschatz, Worthäufigkeit und syntaktische Strukturen. Stilometrische Methoden identifizieren zuverlässig die Urheberschaft in Nachahmungsszenarien (Pastiche) und haben inzwischen auch zur kontradiktorischen (adversarial) Stilometrie geführt, die Anonymisierungsversuche erleichtert und aufdeckt. Verteilungsmuster von Merkmalen wie Funktionswörtern oder Satzzeichen können nur mit hoher Rechenleistung entdeckt werden und scheinen zu wenig Inhalt oder Emotion aufzuweisen, um durch Psi-Fähigkeiten von Medien erkannt zu werden. Eine Imitation auf stilometrischer Ebene ist bisher selbst professionellen Schriftstellern nicht gelungen und scheint auch nicht zu den Fähigkeiten von Savants zu gehören, deren linke Hemisphäre, einschließlich Sprache und Sprechen, am wenigsten entwickelt ist, weshalb auch bei Medien keine solche genuine Begabung anzunehmen ist. Im Ergebnis scheint sich die Stilometrie aufgrund ihrer unbestreitbaren Erfolge, ihrer quantitativen und computergestützten Herangehensweise und ihres Potenzials zur Untersuchung einer Vielzahl von Forschungsfragen als wünschenswerte Hilfswissenschaft für die Mediumismus-Forschung anzubieten.

Schlüsselbegriffe: Einführung in die Stilometrie – Mediumismus-Forschung – Super-Psi – Survival-Psi – Savant-Syndrom

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2 Eine erweiterte deutsche Zusammenfassung befindet sich am Ende des Artikels auf den Seiten 77–79.

Introduction

Mediumistic communications have been studied using various methods for over a hundred years (reviewed in, e. g., Beischel, 2007; Braude, 2003; Fontana, 2004). Research hypotheses on possible anomalistic sources include particularly (1) survival of consciousness (also known as survival psi, which assumes the continued existence of human consciousness or personality after physical death), (2) super psi (also known as living-agent psi or somatic psi, which assumes telepathy, clairvoyance and/or precognition among the living as a source), and (3) the psychic reservoir hypothesis (a cosmic storage location of all information about which mediums should have access) (e. g., Beischel et al., 2021; Irwin & Watt, 2007; Sudduth, 2009). Typically, mediums themselves predominantly attribute their messages to external sources, usually deceased relatives (Maraldi, 2014).

Research methodologies include mainly (1) evidence-oriented investigations in single- and multiple-blind settings (e. g., Beischel et al., 2015; Paraná et al., 2019), (2) process-oriented analyses on the subjective experiences of mediums, including interpretative phenomenological analysis (IPA) (e. g., Beischel & Rock, 2009; Roxburgh & Roe, 2013), (3) studies applying psychophysiological measures such as electromyography (EMG), electroencephalography (EEG) or skin conductance level (SCL) (e. g., Davies & Pettitt, 2022), (4) neurophenomenological investigations processing fMRI technologies (Cardeña et al., 2023), (5) studies using psychometric and brain electrophysiology data (Delorme et al., 2013), (6) approaches with word association tests according to C. G. Jung (Carington, 1945), or (7) studies on cross-correspondences, drop-in communicators, proxy-cases and xenoglossy (e. g., Kelly, 2010).

Regarding the personal writing style of a medium or communicator as part of survival evidence (Moreira-Almeida et al., 2022), some traditional, albeit often informal stylistic assessments of mediumistic messages were carried out (Crofton, 2013; Doyle, 1927; Myers, 1898; Smith, 1924). In some cases, the analysis is limited mainly to the parallels in content between the medium's own publications and the mediumistic writing, such as in Sarah Crofton's study (2013) of W. T. Stead's *Letters from Julia* (1898), in which Stead described himself as the medium of the communicator "Julia," whose messages she assessed as a literary patchwork of Stead's own publications in the journal *Borderland* (1893–1897). In his review (1898) of that same writing, F. W. H. Myers also referred to parallels with *Borderland* in terms of content, but also to the general style of the writing and came to the same conclusion, which he also based on the lack of verifiable information about "Julia's" identity.

Other analyses focus on specific stylistic features of the mediumistic writings, such as Arthur Conan Doyle's detailed assessment (1927) of the mediumistic writings of the communicators "Charles Dickens," "Oscar Wilde" and "Jack London." In examining Thomas Power James' mediumistic sequel (1873) to Charles Dickens' *The Mystery of Edwin Drood* (1870),

Doyle found, for example, that the sequel (1) has similar characteristic chapter titles to the original, (2) frequently shows the same peculiarity of a sudden change from the past to the present tense for events in the past, (3) refers to some characters with grotesque nicknames as in the original, such as the character "Mr. Sapsea" with the epithet "The Great Mind," or (4) uses the English spelling instead of the American spelling, such as "travelers" with two ls. For Doyle, the sequel resembles the original overall, even if it seems to lack the fizz, the sparkle and the spontaneity ("Dickens gone flat").

In Doyle's analysis of Hester Dowden's (or Mrs. Hester Travers Smith's) *Psychic Messages from Oscar Wilde* (1923), Doyle then pointed out that (1) Wilde's fine eye for color is also evident in many adjectives in this writing, such as "apple-green," "creeping like a white mist" or "blood-red fruit," (2) Wilde's rhythm in his literary works also pulsates in sentences such as: "There was not a blood stripe on a tulip, or a curve on a shell, or a tone on the sea but had for me its meaning and its mystery, and its appeal to the imagination," (3) Wilde's cynical humor can be seen in passages such as: "Being dead is the most boring experience in life. That is if one excepts being married or dining with a schoolmaster," or (4) the stylistically homogeneous messages come from two different mediums. Overall, Doyle even ascribes an additional sparkle to this writing compared to the original Wilde. Additionally, Hester Dowden also found striking idiosyncrasies of her communicator "Oscar Wilde" in the same mediumistic writing (1923, p. 81), such as the use of a Greek a or spaces between the letters of words such as *d-eath* or *vin-tage*, which she later also found in facsimile manuscripts by Wilde.

When analyzing the writings of the third communicator "Jack London" (published by Mr. Payne), Dolye then noticed that the attempt at a work of fiction was a failure, but that the self-description of his post-mortem state was very convincing, such as the short, powerful and pregnant sentences in the essay *What Life means to me now*, which reminded Doyle of London at his best and could stand comparison with his lifetime writings. In a broader stylistic context, Saad and de Medeiros (2022) examined the similarity between the signatures of a communicator in automatic handwriting and the handwriting of the deceased during his life-time. In the four investigated signature pairs, the auto-generated signatures were surprisingly similar to those produced by the deceased in life, and also written in a calligraphy different from the medium's natural handwriting.

However, the reliability of such conventional stylistic assessments may be limited since obvious stylistic peculiarities could be easily imitated in general (Juola, 2008, p. 263), such as Dickens' characteristic titles of chapters, his grotesque nicknames of characters or the English spelling. Likewise, Wilde's preference for colorful adjectives or peculiarities such as the spaces between the letters or the Greek a do not seem to be immune to mimicry, while imitating the rhythm of poetry may require some poetic ability. Even historically based comparisons of

an author's content preferences can lead to false conclusions (Juola, 2008, p. 234). As we will see below (cf. "History of Research"), stylometry therefore focuses on other elements such as vocabulary or syntactic properties of a text that are less amenable to such imitation.

To date, only a few computer-aided stylometric studies of mediumistic writings have been carried out (in mainstream research), including Goto's study (2018) on the mediumistic sequel to Charles Dickens' *The Mystery of Edwin Drood* (1870), and Schöberlein's study (2017) on poems in the alleged style of Edgar Allan Poe. In his study, Goto (2018) first investigated the effectiveness of his authorship attribution techniques using six corpora of the leading Victorian novelists: two works by Dickens, including *The Mystery of Edwin Drood*, two works by William Thackeray and two works by George Eliot. According to his study, these methods could successfully distinguish the works of each author from those of the others. He then added James' sequel to the six corpora and analyzed them using the same methods. He concludes that the sequel is clearly different from the works of Dickens and even closer to the works of Thackeray. He concludes that the results indicate that James' claim about the sequel cannot be confirmed.

In his study, Schöberlein (2017) examined 32 prose texts and ten poems with unclear authorship but which had previously been associated with Poe. He writes that "while one might easily dismiss obvious forgeries and pieces Poe allegedly dictated from beyond the grave" (p. 643), some of these potential works of Poe have taken on quite an important role in Poe scholarship. Schöberlein came to the conclusion that results for most poems were unfavorable, only the previously identified poems were consistently recognized, while the excerpts from Lizzie Doten's mediumistic works ("Resurrexi" and parts of "Prophecy of Vala") were attributed exclusively to her own creation. He notes that "[g]iven that Doten claimed to have received these particular pieces from Poe's ghost, she must have been a deceptive medium – Poe's author signal apparently died with him" (p. 653).

Finally, some other forms of text mining are used in the mediumship research field as well, including a linguistic inquiry and word count (LIWC) software (Beischel et al., 2017), or in near-death experience (NDE) research, applying user-independent statistical text examinations (Charland-Verville et al., 2020) or latent semantic analysis techniques to quantify qualitative data (Lange et al., 2015). So far, however, stylometry seems to be hardly known in the field of mediumship and survival research, while noted skeptic Joe Nickell even argued (2007) that stylometric mediumship analysis was interesting in general, but that "statistical differences can fluctuate from passage to passage and may not ultimately prove dependable," which is why he ultimately rejected it. The following sections are therefore intended to provide an initial, necessarily incomplete overview of the history and some applications of stylometry, its linguistic foundations and analysis methodology as well as an assessment of its possible suitability as a future research avenue for a new, quantitative and computer-aided authorship analysis of mediumistic writings.

Stylometry

Stylometry, also known as "stylometrics" or "statistical stylistics" (Sigelman & Jacoby, 1996), is a growing research field, primarily led by contributions from the United States, the United Kingdom, and Poland (Michailidis, 2022). It utilizes statistical methods to analyze an author's writing style, serving as a complementary approach to traditional literary and historical analysis (Holmes & Kardos, 2003). Stylometry involves mathematical techniques to extract quantitative metrics from textual content that help to distinguish genuine stylistic differences from chance variations (Langlois, 2021). A fundamental premise assumes that authors exhibit intrinsic, quantifiable features in their writing style, typically beyond conscious manipulation. These features are quantified to reveal an author's distinctive stylistic fingerprint (Holmes & Kardos, 2003). Various publications provide detailed assessments of stylometry's state of research, forming the foundation for this review (e. g. Holmes & Kardos, 2003; Juola, 2008; Langlois, 2021; Sari, 2018; Stamatatos, 2009).

Literary Case Studies

In certain well-known cases, the application of stylometric techniques has proven highly effective in unveiling the identities of authors who either anonymously published their works or used pseudonyms. In a highly publicized case, the crime novel *The Cuckoo's Calling* was initially attributed to Robert Galbraith when it was published in early 2013, but in a subsequent analysis attributed to J. K. Rowling, renowned for the bestselling *Harry Potter* series (1997–2007) (Ainsworth & Juola, 2019; Juola, 2015). Further examples of successful authorship attribution can be found in the analyses of the play *Double Falsehood* (1727), which was rooted in a collaborative effort between Shakespeare and John Fletcher (Boyd & Pennebaker, 2015), the novels *Wuthering Heights* (1847) (McCarthy & O'Sullivan, 2020), *Frankenstein* (1818) (Suddaby & Ross, 2022), *The Royal Book of Oz* (1921) (Binongo, 2003), or Ludwig Wittgenstein's *Diktat für Schlick* (Oakes & Pichler, 2013).

Some studies also analyzed extensive text corpora, for example from 19th century English literature and the Victorian era, and achieved authorship identification accuracy rates of up to 85% and 75%, respectively (Zhao & Zobel, 2006; Yamashita, 2019). While historical investigations focused on traditional written works, contemporary stylometric scholarship has expanded to include diverse writings like Mormon Scriptures (Holmes, 1992), collaborative authorship (Gladwin et al., 2015), newspapers and radio broadcasts (Airoldi & Skinner, 2007), or online contributions (e. g., Hadjidj, 2014). Stylometry today also investigates issues such as discerning emotional tone, ascertaining gender, estimating composition time, detecting translation, and more (Mahor & Kumar, 2021).

A Diversity of Applications

Stylometry is even applied in various real-life and forensic scenarios, including author iden-tification in phishing e-mails (e. g., Gollub et al., 2013), plagiarism detection (Tsikerdekis & Zeadally, 2014), multiple accounts detection (Juola, 2008), civil and criminal proceedings (Sari, 2018), journalism (Juola, 2008), early detection of memory loss and cognitive capabilities (e. g., Gómez-Adorno et al., 2018), or as indicator of schizophrenia and ketamine poisoning (Brown & Covington, 2005). Stylometry extends beyond individual author identification to analyze group identity characteristics like gender, dialect, cultural background, nationality, educational level, and personality traits (Juola, 2008), with studies achieving notable accuracy, such as dis-tinguishing gender with an accuracy rate of 80% and more (Koppel et al., 2003).

A study exploring gender portrayal in Shakespeare's plays, analyzing character dialogues, achieved a correct classification rate of 60% to 75% based on the speaker's gender, suggesting that while Shakespeare had an intuitive understanding of linguistic distinctions, traces of his own masculine influence persisted (Juola, 2008). Modern stylometry, including behavioral stylometry, can also identify decision-makers solely based on their decisions, with a study achieving a 98% accuracy rate in correctly identifying a chess player from a series of games (McIlroy-Young et al., 2021). Furthermore, stylometry is applied to analyze musical styles, allowing for the successful distinction of composers like Bach, Handel, Telemann, Mozart, and Haydn with minimal error rates ranging from 4% to 9% (Backer & van Kranenburg, 2004).

History of Research

The origin of stylometry can be traced back to the authorship debate surrounding the play *The Two Noble Kinsmen*, staged in 1634, and the subsequent century-long discourse on objectively quantifying literary style (Holmes & Kardos, 2003). The evolution of authorship attribution methods has progressed through three phases emphasizing (1) numerical functions, (2) statis-tical assessments, and, more recently, (3) machine learning techniques and high-dimensional text features (Koppel et al., 2009; Stamatatos, 2009; Stamatatos & Koppel, 2011).

The first phase of stylometry, beginning in 1851 with Augustus de Morgan, proposed using word length to determine authorship, and Thomas Mendenhall measuring (1887) word lengths in works attributed to Bacon and Shakespeare (Holmes & Kardos, 2003). However, later studies revealed the unreliability of this approach, as Mendenhall's analysis showed a prevalence of four-letter words in both Shakespeare and Marlowe's writings, suggesting an inconclusive pat-tern for distinguishing authors and leading to a hypothesis that the young Shakespeare was influenced by Marlowe (Sari, 2018).

In the second phase of stylometry in the mid-20th century, statistical methods pioneered by Zipf (1932) and Yule (1939) were increasingly employed (Sari, 2018; Stamatatos, 2009), adopting a unitary invariant paradigm focusing on a single numerical parameter (e. g., Koppel et al., 2009; Sari, 2018). However, Grieve's experiments (2002) demonstrated that combining word and punctuation profiles improved reliability, leading to a shift towards multivariate analysis in contemporary attribution studies for enhanced reliability, richer information (Sari, 2018) and greater resistance to deliberate manipulation compared to individual word usage (Juola, 2008).

In the early 1960s, statisticians Frederick Mosteller and David Wallace successfully applied statistical methodologies to analyze the disputed authorship of the "Federalist Papers," a collection of 85 political essays published in 1787 and 1788, attributing the twelve contested essays to James Madison based on the frequency of common function words such as "the," "of," "about," "and," etc. (Holmes & Kardos, 2003; Juola, 2008; Sari, 2018; Stamatatos, 2009). In the late 1980s and early 1990s, John Burrows made further significant contributions to stylometry by employing a method called "Delta" (Burrows, 2002, ref. in Juola, 2008), which involved analyzing the frequencies of around seventy-five function words (Holmes & Kardos, 2003). He compared their occurrence with established norms and calculated the mean of the absolute differences between the values to determine the most analogous writing style, which eventually became the established approach for stylometric analysis and the benchmark for evaluating alternative methods (Holmes & Kardos, 2003; Sari, 2018; Juola, 2008).

Finally, the systematic studies by Mosteller and Wallace (1963; 1964, ref. in Sari, 2018) laid the foundation for the third phase of the further development of this field in the contemporary era of computer-assisted stylometry (Holmes & Kardos, 2003), with a shift towards methodologies grounded in supervised machine learning, such as the Support Vector Machine (SVM) and neural networks (e. g., Sari, 2008), gaining prominence and addressing challenges in detecting hidden patterns in large text datasets (e. g., Holmes & Kardos, 2003). The application of artificial intelligence in stylometry, particularly neural networks, has shown substantial promise (Langlois, 2021), with notable studies, such as the analysis of the Shakespeare/Fletcher dispute (Matthews & Merriam, 1993), using training sets to differentiate authors and affirming the collaborative nature of specific works (Holmes & Kardos, 2003).

Three Types of Authorship Analysis

In author attribution (AA), the focus is on determining the author of anonymous texts (e. g., Langlois, 2021; Stamatatos & Koppel, 2011), with studies addressing scenarios involving a closed candidate set or a more challenging "open-class" problem where authors are identified beyond a limited set (Juola, 2008), employing advanced techniques to quantify stylistic similarity

for effective author identification (Plecháč et al., 2019). In authorship verification (AV), the goal is to determine if provided texts, seemingly from a single author, are genuinely the work of that author (e. g., Langlois, 2021; Stamatatos & Koppel, 2011), which is typically considered in the context of plagiarism analysis (Koppel et al., 2012), employing machine learning methodologies to achieve effective results even in scenarios with a substantial number of potential authors (Langlois, 2021, Koppel et al., 2013). The task of authorship characterization (profiling) focuses on identifying distinctive stylistic attributes defining the writing style of a specific author (Langlois, 2021), examining sociolinguistic properties such as gender, age, profession, educational background, nationality, and language usage (e. g., Juola, 2008; Langlois, 2021), although research indicates a shortage of universally applicable, optimized functionalities in this domain (Langlois, 2021).

To enhance reliability, methods for authorship attribution aim to include a substantial portion of the words in a document, with efforts to correlate comprehensive aggregate statistics on word properties. However, traditional approaches using superficial features like mean sentence length or vocabulary richness have not demonstrated sufficient accuracy (Juola, 2008), leading to an alternative strategy focusing on a reasonably extensive subset of the document's vocabulary, known as "function words," which has become a benchmark for accuracy in authorship attribution (Burrows, 2002, ref. in Juola, 2008). Syntactic attributes in authorship attribution involve analyzing patterns used to form sentences, especially focusing on topic-independent function words and punctuation (e. g., Juola, 2008; Langlois, 2021), where the flexibility and individual preference of function words influence statistical patterns, and combining both lexical and syntactic features to further enhance the effectiveness of authorship attribution (Juola, 2008).

Attributional Analysis

The first methodological step in the author analysis is to select a feature set, whereby a large number of feature sets are proposed (Rudman, 1998), but with little consensus on the best ones (e. g., Juola, 2008). The subsequent task is to identify authors using various analysis methods, where the challenge lies in measuring similarity, again with no consensus on the best approach (Juola, 2008). The analysis can be unsupervised, exploring patterns independently (Juola, 2008), or supervised, categorizing documents before analysis using techniques like simple statistics, linear discriminant analysis (LDA), and Burrows' "Delta" technique, the latter being a prominent method for evaluating authorship attribution methodologies (details can be found in Juola, 2008, pp. 277–286). The efficacy of authorship attribution systems is influenced by variables such as the quantity of authors and writing examples, text volume, the size of the writing sample, the publication period, and various factors affecting writing style, including education, nationality, topic, genre, age, and style changes over time (e. g., Lancashire & Hirst, 2009; Mikros & Argiri, 2007).

Imitation and Obfuscation

Stylometric methods are effective in detecting authorship even when authors deliberately attempt to imitate the style of another author (pastiche). Studies on pastiches of Maurice Leblanc's crime novels featuring "Arsène Lupin" (Schöch, 2016), Raymond Chandler's hard-boiled detective fiction (Sigelman & Jacoby, 1996), Lewis Carroll's *Alice's Adventures in Wonderland* (1865) (Somers & Tweedie, 2003), or Romanian author Mateiu Caragiale's novels (Dinu et al., 2012) show that pastiches form distinct clusters separate from the original author's works, and quantitative analysis of specific stylistic features provides clear evidence of authorship attribution (Somers & Tweedie, 2003, ref. in Juola, 2008, pp. 315–316, and Lynch, 2009, pp. 38–39).

In adversarial stylometry, efforts to preserve anonymity require robust defenses against de-anonymization (e. g., Brennan et al., 2012), and potential manipulations of writing styles require counter-mechanisms within authentication systems (Langlois, 2021). Afroz and colleagues (2012) showed that imitation and obfuscation can be detected with high accuracy using a large feature set. The current state of the art seems to provide a perfect balance between privacy and security: Authors who are deceptive in their writing style may be difficult to identify, but their deception itself is often detectable. The detection approach works best in cases where the author fraudulently presents himself as another author (Afroz et al., 2012). However, authors such as the Portuguese poet Fernando Pessoa or the French writer Romain Gary, who often wrote under pseudonyms, can also create author profiles that reflect all the characteristics of individual people from a stylometric point of view (Skorinkin & Orekhow, 2023).

Potential Future Mediumship Research

Our literature review (cf. also Weibel, 2023, with further references) leads to the crucial finding that stylometric authorship attribution actually works and is capable of identifying the document's author with a probability that is significantly better than mere chance (Juola, 2008). In particular, the typical authorship attribution analysis with a limited, predefined number of candidates, namely the verification of whether two texts have the same author, can be addressed with a relatively high degree of accuracy by established methods (Koppel et al., 2013) and therefore also seems suitable for the examination of mediumistic writings.

Today's common use of high-frequency function words could, due to their context-agnostic nature, minimize the tendency to focus on certain topics (Koppel & Schler, 2003), which could also be helpful in the analysis of mediumistic writings. As with literary works being compared to writings by distractor authors with demographic similarities (Juola, 2015), the mediumistic

texts should be compared to control texts from contemporary mediums and their communicators to avoid coincidental similarities.

Author attribution (AA) attempts to determine which of several authors with known publications wrote an anonymous text (Langlois, 2021; Stamatatos & Koppel, 2011) and could therefore also be a suitable strategy to find out whether the medium or the communicator is the author of a mediumistic writing, provided that lifetime texts are available from both. Bearing in mind the study on the closely related writing style of the medieval Serb Danilo and his student (Juola, 2008), the possibility should always be examined whether the medium and communicator worked closely together during their lifetime or even published texts together.

Typically, the self-attributed name of the communicator is known, as is usually the identity of the medium, which is why the analysis of mediumistic writings may also correspond to the task with a "closed group" of candidates, as in the "Federalist Papers" (Juola, 2008). However, it is also possible that both medium and communicator could use a pseudonym in an open or hidden way, potentially expanding the pool of candidates to include more mediums and communicators and leading to a much more complicated "open class" problem (Juola 2008) (Juola, 2008). Even more difficult would be the examination of writings by communicators or controls with no lifetime publications, which could at least be analyzed for possible correspondences with the medium's authorial signal. At the very least, such writings could be analyzed for the potential involvement of several authors, such as in Holmes' assessment of the Mormon Scriptures (1992). However, authors can also create several independent author profiles, which appear to belong to individual persons (Skorinkin & Ohrekov 2023), which is why the investigation of a communicator's independence usually has to be done through a comparison with his lifetime publications.

Authorship verification (AV) usually focuses on potential plagiarists who claim authorship of a text (Langlois, 2021; Stamatatos & Koppel, 2011), while mediums usually don't claim to be the actual author of their mediumistic writings. However, the communicator's declared claim to be the author of the message may be verified in an analogous way, and possibly the medium's claim not to be its author. Possible conscious or unconscious changes in the authors' writing style over time (Koppel et al., 2007) must also be taken into account as complicating circumstances when compiling and analyzing the text corpus.

Even authorship characterization (profiling) may be helpful when examining mediumistic writings, as the analysis of group identity characteristics (Juola, 2008; Mahor & Kumar, 2021) could also provide conclusions about the authorship of the writings, especially if no comparative text of a communicator or medium is available. Simply determining the gender of the author could lead to important hints, for example in the case of a female medium conveying texts by a male communicator. Mediums may also differ from the communicator in terms of

dialect, cultural background, nationality, level of education, personality characteristics, among others. And even just determining the number of authors of a mediumistic text could be a relevant insight, provided that in fact only the medium wrote down the text. But when determining gender in particular, one should also consider the study findings that Shakespeare was able to write dialogues with female speech patterns, although the classification rate was only 60% to 75% (Hota et al., 2006).

The authorial signal can be obscured by a variety of known factors such as genre, gender, timing or translation (Eder, 2017), and, in the case of mediumistic messages, possibly also by a noisy authorial signal from the medium. Because of such potential signal interference, a large text volume should be chosen that may exceed the limit of 5000 words. Furthermore, because authors may experience changes in style over time or due to an illness such as dementia (Lancashire & Hirst, 2009), a wide range of lifetime control texts from different periods of the communicator and medium should be tested. However, the observed tendency of authors to maintain consistent language patterns across publications (Gómez-Adorno et al., 2018) may also suggest the analysis of writings from several mediums with a common communicator.

When analyzing mediumistic texts, they should always be checked for their affiliation to one of the four categories of gender and topic developed by Stamatatos (2016). For example, with a mediumistic poem and a lifetime drama by the communicator, each with different topics, a potentially challenging cross-genre and cross-topic constellation could arise. In this case, a strategy of masking topic-specific information (Stamatatos, 2017) or filtering out the genre effect (Oakes, 2017) could potentially help with the analysis.

Furthermore, Forsyth and Lam's study (2014) on the survival of authorial preferences in translations seems to allow the comparison of mediumistic writings with the communicator's control texts translated into the same language. As for the behavioral stylometric studies on chess games by McIlroy-Young and colleagues (2021), they may even enable further evaluation of the Maróczy vs. Korchnoi chess match (Eisenbeiss & Hassler, 2006; Neppe, 2007) or investigations of new chess games which a medium could now play against a chess computer. In addition, musical stylometry (Backer & van Kranenburg, 2004) may be used to re-examine the mediumistic compositions of Rosemary Brown (Heywood, 1971).

The noted inability of professional authors to create stylistically consistent pastiches (e. g., Dinu et al., 2012; Schöch, 2016; Sigelman & Jacoby, 1996) indicates that mediums may also hardly ever succeed in creating deceptive imitations on a stylometric level, especially since they are not always experienced authors. However, the potential use of adversarial stylometry (Brennan et al., 2012) now could raise the risk of deliberate or even computer-assisted imitation attempts on a stylometric level, which could best be reduced through controlled prospective studies in which the writing process is controlled and the text produced is stored immediately

and protected from editing. After all, historical mediums from the time before to-day's standard of stylometric research are unlikely to even have taken stylometric-level factors into account in possible attempts at imitation.

As with standard stylometric studies (Rudman, 1998), analyzes of mediumistic writings should ideally be carried out in a multidisciplinary setting, i.e., through cooperation between linguists, statisticians, historians of mediumship research, etc. To ensure text purity, prospective studies with experienced or certified mediums should be carried out. With the tool used, tests should first be done with publications by popular authors in order to evaluate its performance. Well-known tools include the Java Graphical Authorship Attribution Program (JGAAP), Signature, stylo, or Multilingual WebSty (WebSty), which are suitable for analyzing various linguistic features in large data sets. WebSty, for example, is characterized by offering particularly user-friendly integrated language tools and visualization techniques, such as interactive dendograms, heatmaps, and multidimensional scaling (e. g., Eder et al., 2017; Piasecki et al., 2018).

Living-Agent Psi

When interpreting authorship attribution to mediumistic texts, the question arises as to whether any hits in the reproduction of stylometric patterns could be explained through survival psi, living-agent psi (LAP), or the psychic reservoir hypothesis. At this point we will essentially limit ourselves to an examination of LAP as an explanatory model. In many cases, the communicator's lifetime publications may already be known to the medium in a normal way, leaving only the question of imitation to be resolved. However, the medium may not always have access to the communicator's lifetime writings, as with drop-in communicators, raising the question of LAP as a possible source for identifyng the stylometric patterns.

One of the possible questions in this context may relate to the potential suitability of extrasensory perception (ESP) for the detection of stylometric patterns. In ESP research, targets with rather abstract and emotionless content, such as the Zener cards in forced-choice experiments, have now mostly been replaced by a different type of targets in free-choice experiments (Broughton, 2015). Features of such target, especially in remote viewing settings, include: (1) movement vs. static; (2) surprising, interesting, and meaningful content but not disturbing; (3) use of objects or elements in which the foreground is distinctive from the background; (4) the portrayal of a potentially realistic scene or object vs. one that is abstract or presented in an unrealistic or unrecognizable fashion; (5) targets with thermodynamic properties; and (6) emotion-triggering images, among others (see detailed references in Katz et al., 2021; Krippner et al., 2019).

Typical stylometric distribution patterns, for example function words or punctuation marks, are characterized by a particular absence of specific meaning (Juola, 2008) and generally appear to bear little resemblance to the ESP-promoting targets. Furthermore, LAP would need to capture not only these stylometric features, but also their distribution patterns, which can only be isolated with high computing power, for which clairvoyance and telepathy may lack the capacity in general. In addition, the diagram results of stylometric analyzes do not directly show the actual distribution patterns in the text, but only parameters of their mutual distance, which is why precognition is probably not suitable for perceiving these patterns. LAP therefore seems to be generally unsuitable for the cognition of stylometric features and their distribution patterns. Presumably the cognition of these patterns from a psychic reservoir would in principle lead to similar difficulties. In contrast, as genuine stylistic properties of a communicator's consciousness, these may seem to be naturally consistent with survival psi.

Savant-Syndrome

Assuming, as a thought experiment, that LAP should still be considered a method for identifying such patterns, or that mediums would at least recognize the text without necessarily identifying the patterns, we would still need to explain how the medium could mimic these patterns. Therefore, we need to evaluate a number of well-known non-survivalist arguments, such as the "Usual Suspects" mentioned by Steven Braude (2021), which include fraud, malobservation, misreporting and cryptomnesia (hidden memories). Prima facie, fraud and cryptomnesia in particular do not seem to be ruled out, since mediums could perhaps consciously try to imitate a communicator's lifetime publications, or unconsciously through hidden memories. However, as mentioned above, even professional authors are hardly capable of imitation on a stylometric level (e.g., Schöch, 2016), which is why imitation through fraud or cryptomnesia would be unlikely as well.

Therefore, a second level of non-suvivalist explanations would have to be taken into account, which Braude calls "Unusual Suspects" (2021). These include rare or anomalous processes, such as instances marked by a fusion of dissociation and latent creative capabilities, extraordinary feats such as "photographic" memory, or phenomena reminiscent of atypical or rare manifestations of savantism. According to Braude (2021), robust evidence for a survival case requires skills attributed to deceased individuals who belong to categories or demonstrate degrees that usually require conscious practice and are rarely (if ever) found in prodigies or savants. We therefore have to ask whether one of these "Unusual Suspects," especially savants, has already manifested stylistic skills at a stylometric level.

Savant-syndrome is a rare but spectacular condition in which persons with developmental disabilities, including but not limited to autism, have some spectacular "islands of genius" that

stand in extraordinary contrast to their overall limitations (Treffert, 2014). The incidence of savant syndrome in the autism spectrum disorder (ASD) population is higher than that in the general population, but was also observed in groups without intellectual disabilities (Bölte et al., 2002). It affects males 4–6 times more frequently than females (Park, 2023). Approximately one in ten persons with autism has savant skills; so nine out of ten do not. Approximately 1 out of 1,400 persons with mental retardation or central nervous system (CNS) deficits other than autism do have savant skills so such abilities are not limited to autistic disorder. Hence not all autistic persons are savants, and not all savants are autistic (Treffert, 2014). Genius and prodigy exist separate from savant syndrome and not all such highly gifted persons have Asperger's Disorder (Treffert, 2014).

Insular talents are often connected to an unusual memory: narrowly focused and profound, but purely schematic and practically without any substantive understanding of the matter. Some early observers aptly spoke of a "memory without comprehension" (Treffert & Wallace, 2002). One reason that many savants, or many autistic persons, have IQ scores below 70 is that IQ measurement depends so heavily on verbal scales, and many autistic individuals, including those with savant syndrome, have language (verbal) deficits as an intrinsic part of the underlying disorder (Treffert, 2014). Savants can be creative, rather than just duplicative, and the skills increase over time on a continuum from duplication, to improvisation to creation, rather than diminishing or suddenly disappearing. With respect to music, savants were able to show some creativity and improvisation in addition to mimicry (Treffert, 2014).

To date, only about 100 spectacular (prodigious) and well-documented savant cases are known. They must be differentiated from the much more common "talented" savants, who are only considered gifted relative to their other impairments (Bölte et al., 2002). The investigated repertoire of outstanding skills is usually limited. It typically affects talents in the right hemisphere of the brain, i. e., primarily non-symbolic, artistic, visual and motor talents. In contrast, the left hemisphere represents skills that are more sequential, logical and symbolic, including language and speaking, which are the least developed abilities of savants (Treffert & Wallace, 2002). Cognitive peaks involve normally visuospatial skills or rote memory (mechanical memory), while scores tend to be lowest on tests involving verbal abstraction or comprehension (Howlin et al., 2009).

The most common skills concern memory (reproduction of timetables, sports results, etc.), arithmetic (generating prime numbers, square roots, multiplication, calendar calculations), and music (memory, reproduction proficiency in musical instrument playing) (e. g., Bölte et al., 2002; Park, 2023; Treffert & Wallace, 2002). Less frequently reported are 'pseudo-verbal' skills such as hyperlexia (which is early reading without understanding the text), the ability to speak many foreign languages, drawing (reproduction of observed objects in photo quality), coordi-

nation skills, mechanical aptitude, unusual sensory discrimination, athletics, or outstanding knowledge in specific fields such as neurophysiology, statistics, navigation or computers, for example (Howlin et al., 2009).

Overall, savants do have certain linguistic abilities in certain areas, such as hyperlexia or speaking several foreign languages. However, savants who were able to stylistically imitate texts do not seem to be known, or even cases in which such imitation attempts were reported at all. In contrast to purely mechanical reproduction, certain creative achievements seem to be possible in rare cases, but here again not in text production. As a result, savants' abilities hardly seem to be suitable as an explanation for possible stylometric achievements of mediums. As shown, even experienced professional authors hardly ever seem to be able to imitate another author's stylistic patterns on a stylometric level. Presumably the best imitator of a given text may still be its actual author, as survival psi would naturally suggest again.

Conclusion

As this review may have shown, research into stylometric analysis of mediumistic writings is still in its infancy and awaits clarification of many methodological and theoretical questions. Nevertheless, the undeniable success and diversity of stylometric means for investigating the authorship of given texts seem to argue for a tentative, data-driven and open-ended application of stylometry as an auxiliary science in future mediumship research. The quantitative, computer-aided approach and the reliable results of stylometric studies that are inherently repeatable may offer valuable advantages of a potentially new, yet unexplored avenue in the field of survival research. The vast digitized material of mediumistic writings, the potential answers to a wide range of research questions and also the relevance of their results for authorship attribution in mediumship research and for the discourse on survival psi and LAP, may hopefully motivate future interdisciplinary research in this area.

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Erweiterte Zusammenfassung

Die meisten Studien zum persönlichen Schreibstil von Medien und Kommunikatoren basierten in der Vergangenheit auf traditioneller Stilistik und untersuchten insbesondere auffällige stilistische Eigenheiten (Doyle, 1927; Smith, 1924) oder inhaltliche Gemeinsamkeiten der Texte (Crofton, 2013; Myers, 1898). Offensichtliche Besonderheiten, wie etwa Oscar Wildes Vorliebe für farbige Adjektive (z. B. "apple-green"; "blood-red fruit") oder seine idiosynkratische Verwendung des griechischen Buchstabens α (Doyle, 1927) können jedoch tendenziell einfach nachgeahmt werden, weshalb diese Methode als wenig zuverlässig gilt (Juola, 2008, S. 263). Einen alternativen Ansatz bietet die Stilometrie, welche sich auf bestimmte Eigenheiten von Wortschatz und Syntax konzentriert, die weniger anfällig für Imitationen sind. Der Einsatz von Stilometrie zur Zuordnung der Urheberschaft von mediumistischen Schriften wurde allerdings erst in wenigen Studien (Goto, 2018; Schöberlein, 2017) erforscht, weshalb die folgende Literaturrecherche einen Überblick über die Geschichte und Anwendung der Stilometrie sowie eine Einschätzung ihrer möglichen Eignung als zuküftige Forschungsmethode enthält.

Stilometrie ist ein wachsender Forschungszweig zur statistischen Urheberschaftsanalyse, die in der Vergangenheit erfolgreich zur Aufdeckung anonymer Autoren verwendet wurde, wie zum Beispiel von J. K. Rowling als der wahren Autorin von *The Cuckoo's Calling* (2013) (Ainsworth & Juola, 2019). Weitere Beispiele finden sich etwa in den erfolgreichen Analysen zu *Double Falsehood* (1727), einer Zusammenarbeit von Shakespeare und John Fletcher, oder der Romane *Wuthering Heights* (1847) (McCarthy & O'Sullivan, 2020), *Frankenstein* (1818) (Suddaby & Ross, 2022) und *The Royal Book of Oz* (1921) (Binongo, 2003). Stilometrie umfasst heute auch forensische Anwendungen zur Identifizierung von Plagiaten (Tsikerdekis & Zeadally, 2014) und phishing-E-Mails (Gollub et al., 2013), zur Früherkennung von Gedächtnisverlust (Gómez-Adorno et al., 2018) oder zur Bestimmung von Gruppenzugehörigkeiten wie Geschlecht, Dialekt, kulturellem Hintergrund oder Ausbildungsgrad (Juola, 2008).

Die Geschichte der Stilometrie umfasst drei Phasen, beginnend im 19. Jahrhundert mit Thomas Mendenhalls Analysen (1887) von numerischen Funktionen auf der Basis von Wortlängen, welche sich später jedoch als unzuverlässig erwiesen (Sari, 2018). Meilensteine in der zweiten Phase waren zu Beginn der 1960er-Jahre eine von Frederick Mosteller and David Wallace entwickelte Methode basierend auf der Häufigkeit von Funktionswörtern wie „das", „von", „und" usw. (Holmes & Kardos, 2003) und die von John Burrows entwickelte „Delta"-Methode (Juola, 2008), welche einen neuen Standard und Prüfstein für die Evaluation alternativer Methoden etablierte (Sari, 2018). In der dritten Phase verlagerte sich die computergestützte Stilometrie immer mehr zu Methoden des maschinellen Lernens, wie der Support Vector Machine (SVM) und neuronaler Netzwerke, welche versteckte Muster selbst in großen Textdatensätzen erkennen können (Holmes & Kardos, 2003).

Die Urheberschaftsanalyse dient meist (1) zur Identifikation eines anonymen Autors aus einem geschlossenen oder offenen Set von Autoren (Langlois, 2021), (2) zu Analysen möglicher Plagiate (Stamatatos & Koppel, 2011) oder (3) zur Charakterisierung (profiling) eines anonymen Autors anhand charakteristischer Merkmale wie Geschlecht, Alter, Beruf, Bildungsstand, Nationalität und Sprachgebrauch (Juola, 2008). Bei stilometrischen Analysen ist die Verteilung häufiger Wörter wie namentlich der Funktionswörter ein entscheidendes Element für die zuverlässige Unterscheidung zwischen Autoren, während lexikalische Funktionen wie der Umfang des Vokabulars oder eine charakteristische Wortwahl anfällig für Manipulationen sein können (Juola, 2008). Die Wirksamkeit der Analysen wird durch Variablen wie die Anzahl der Autoren, den Textumfang, den Veröffentlichungszeitraum beeinflusst oder auch Faktoren wie Bildung, Nationalität, Thema, Genre, Alter und Veränderungen des Stils im Laufe der Zeit (Lancashire & Hirst, 2009; Mikros & Argiri, 2007).

Stilometrische Methoden sind auch bei der Analyse von Autoren wirksam, welche bewusst den Stil eines anderen Autors zu imitieren versuchen (Pastiche). Studien etwa zu Pastiches von Maurcie Leblancs „Arsène Lupin"-Kriminalromanen (Schöch, 2016), von Raymond Chandlers „hard-boiled" Detektivliteratur (Sigelman & Jacoby, 1996), Lewis Carrolls *Alice im Wunderland* (1865) (Somers & Tweedie, 2003) oder von Romanen des rumänischen Autors Mateiu Caragiale (Dinu et al., 2012) zeigen, dass sich Pastiches auf stilometrischer Ebene trotzdem vom imitierten Original unterscheiden lassen. Mit stilometrischen Mitteln kann sodann auch die Identität eines Autors verschleiert werden (adversarial stylometry), der ansonsten zum Beispiel politische Verfolgung befürchten müsste (Brennan et al., 2012). Solche Autoren sind dann möglicherweise schwer zu identifizieren, aber ihre Täuschung selbst ist oft erkennbar, was zu einem perfekten Gleichgewicht zwischen Privatsphäre und Sicherheit führt (Afroz et al., 2012). Gewisse Autoren wie etwa der französische Schriftsteller Romain Gary, der oft unter Pseudonymen schrieb, können zudem Autorenprofile erstellen, die aus stilometrischer Sicht alle Eigenschaften unabhängiger Persönlichkeiten widerspiegeln (Skorinkin & Orekhow, 2023).

Die vorliegende Literaturrecherche (vgl. auch Weibel, 2023, mit weiteren Referenzen) führt zum Ergebnis, dass Stilometrie tatsächlich funktioniert und die Identifizierung anonymer Autoren mit einer deutlich über dem Zufall liegenden Wahrscheinlichkeit möglich ist (Juola, 2008). Sie scheint sich somit grundsätzlich auch zur Analyse mediumistischer Schriften zu eignen, welche namentlich mit lebenszeitlichen Publikationen der jeweiligen Kommunikatoren verglichen werden können. Bereits die Feststellung einer Gruppenzugehörigkeit wie etwa des Geschlechts eines Autors könnte hierbei bedeutsame Hinweise liefern, zum Beispiel bei Schriften eines weiblichen Mediums, die einem männlichen Kommunikator zugeordnet werden. Die Verteilungsmuster etwa von Funktionswörtern oder Satzzeichen sind sodann nur mit hoher Rechenleistung erkennbar (Juola, 2008) und dürften zudem auch wegen ihres marginalen Bedeutungsgehaltes allfälligen Psi-Fähigkeiten des Mediums (living-agent psi) kaum zugänglich sein. Als Eigenschaften des (Unter-)Bewusstseins eines Kommunikators wären solche stilistischen Muster hingegen von Natur aus vergleichsweise einfach mit der Überlebens-Hypothese (survival psi) vereinbar.

Als mögliche Ursache für stilistische Übereinstimmungen wären immer auch Steven Braudes „übliche Verdächtigen" (Braude 2021) wie namentlich Betrug und Kryptomnesie (versteckte Erinnerungen) in Betracht zu ziehen. Allerdings scheint die Imitation solcher Stilstrukturen selbst für professionelle Schriftsteller zumindest auf stilometrischer Ebene kaum möglich (Schöch, 2016; Sigelman & Jacoby, 1996), was somit tendenziell auch für Medien gelten dürfte. Heutzutage könnte jedoch der potenzielle Einsatz stilometrischer Methoden (Brennan et al., 2012) das Risiko absichtlicher und computergestützter Nachahmungsversuche erhöhen, welches durch kontrollierte prospektive Studien reduziert werden könnte. Auf einer zweiten Ebene kämen zudem als denkbare Ursachen auch Braudes „unübliche Verdächtige" (Braude 2021) in Frage, zu denen seltene Prozesse wie das „fotografische" Gedächtnis oder ungewöhnliche Manifestationen des Savantismus gehören. Stilistische Imitation geht jedoch über „fotografische" Kopien eines Textes hinaus, und selbst Savants scheinen wegen ihrer am wenigsten entwickelten Fähigkeiten der linken Hemisphäre, welche auch Sprache und Sprechen umfassen, kaum in der Lage zu sein, komplexe stilometrische Strukturen zu imitieren.

Wie diese notwendigerweise unvollständige Übersicht gezeigt haben mag, steckt die Forschung zur stilometrischen Analyse mediumistischer Schriften noch in den Kinderschuhen. Dennoch scheinen die unbestreitbaren Erfolge stilometrischer Methoden und namentlich der quantitative und computergestützte Ansatz mit beliebig wiederholbaren Ergebnissen für eine ergebnisoffene Anwendung als Hilfswissenschaft in der zukünftigen Medienforschung zu sprechen. Das umfangreiche, inzwischen digital zur Verfügung stehende Material mediumistischer Schriften und das Potenzial, ein breites Spektrum möglicher Forschungsfragen beantworten zu können, mögen ebenfalls zu künftigen interdisziplinären Studien in diesem spannenden, noch weitgehend unerschlossenen Feld motivieren.