A CALIFORNIAN-IBERIAN APPROACH ON TECHNOLOGICAL ADOPTION AND AUTOMATION IN COURTROOMS: THE CASE OF VOICE WRITING

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Abstract

In the 1940s, voice writing began to be implemented in United States courts. It transcended the abilities of shorthand reporters, who had difficulties in following the fast pace of speakers, and introduced the first stenomask, a device designed to confine the voice of the reporter. Voice writing also used a microphone and a recording machine; a typist would afterwards reproduce the audio in written form. In the 2000s, voice recognition software was set at the end of the process, allowing for real-time transcripts. Compared to stenotyping, the technique has been competitive enough regarding quality and training requirements. Besides, it has represented greater accessibility for deaf and hard-of-hearing citizens, who can now read the captions a few seconds later. However, uncertainty has set in among these well-remunerated professionals: is artificial intelligence (AI) a real threat for voice writers? And what is the situation in Spain and Portugal? This paper aims to describe the experience of voice writing in US courts, as it is an unfamiliar practice in the peninsular area, as well as to examine the challenges posed by AI to respeakers. It also analyses the procedural frameworks in Portugal, Spain and California that allow for or forbid the presence of such professionals. In addition, the analysis describes the opportunities for implementing voice writing and AI in the Iberian courtrooms, and the impact that AI might have in the United States.

Keywords: voice writing, respeaking, captions, automation, artificial intelligence

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Resumo

Na década de 1940, a escrita de voz ou "refalado" (*voice writing,* em inglês americano), começou a ser implementada nos tribunais dos Estados Unidos, ultrapassando as capacidades dos estenógrafos, que tinham dificuldade em acompanhar o ritmo acelerado dos oradores, e introduziu a primeira estenomáscara, um dispositivo destinado a confinar a voz do relator. A escrita de voz também usava um microfone e uma máquina de gravação; um datilógrafo reproduziria o áudio posteriormente. Na década de 2000, um software de reconhecimento de voz foi instalado no final do processo, permitindo transcrições em tempo real. Comparada com a estenotipia, a técnica da escrita de voz tem sido bastante competitiva na última década em termos de qualidade e requisitos de formação. Além disso, representou maior acessibilidade para cidadãos surdos e com deficiências auditivas, que agora podem ler as legendas imediatamente. No entanto, a incerteza tem vindo a instalar-se nesta bem remunerada profissão: a inteligência artificial (IA) é uma ameaça real para os *voice writers*? E qual a situação em Espanha e Portugal? Este artigo tem como objetivo descrever a experiência da escrita de voz nos tribunais dos EUA, uma vez que se trata de uma prática desconhecida na Península Ibérica, bem como examinar os desafios colocados pela IA aos relatores. Analisa também os quadros processuais em Portugal, Espanha e Califórnia que permitem ou proíbem a presença destes profissionais. Além disso, a análise descreve as oportunidades de implementação da escrita de voz e da IA nas salas de audiências ibéricas e o impacto que a IA poderá ter nos Estados Unidos.

Palavras-chave: escrita de voz, refalado, legendas, automação, inteligência artificial

1. Introduction

In the 1940s, voice writing began to be implemented in the United States courts. Shorthand reporters had, in previous years, enormous difficulties in following the fast pace

of speeches using a pen and a notebook, or eventually a typewriter. Tachygraphy, also called stenography, uses singular traces to simplify letters, words and phrases, but was quite impractical for the legal and public administration fields (Rufino Morales, 2020). The quality of the output is a crucial aspect in court transcripts, as it ensures the fairness of legal proceedings; mistakes or inaccuracies could result in erroneous convictions and unnecessary actions (Etulle et al., 2023).

With the initial voice writing techniques, professional reporters used a microphone inserted into a metallic box positioned near the face, so as to avoid external disturbances, and at the same time repeated the exact phrases that were spoken during the hearings. The microphone was connected to a recording machine, and afterwards a typist or eventually the reporters themselves would reproduce the audio and elaborate content in written form. A great pioneer in the matter was Horace Webb, from the Chicago area, who attained a higher standard in the voice writing instrument by using a stenomask, that is, an adaptation of an Air Force pilot's mask that provided an adequate face-device adjustment and remained convenient for working long periods (National Verbatim Reporters Association, 2023).

In the 2000s, voice recognition (VR) software was implemented at the end of the process, allowing for real time transcripts of the respoken output. Since then, following the improvement of information and communication technologies, VR systems have increased in accuracy; moreover, they have meant greater accessibility for deaf and hard-of-hearing citizens, who can read the captions displayed on the screens with only a few seconds' delay.

The professionals currently working on verbatim reporting in the United States are of two distinct specialisations: stenotypists and voice writers. Stenotypists use a sophisticated keyboard with keys related to syllables. This complexity means that becoming a stenotype specialist requires at least three or four years of demanding training; therefore, most of the candidates, approximately 90% of them, do not attain the necessary level of

expertise or drop out during the instruction period (Proctor, 2023). In contrast, voice writers or respeakers have become competitive enough regarding quality and training requirements, as they need approximately one year to master the profession and the VR software precision is now at acceptable levels.

Thus, American authorities have created distinct accreditation systems considering the sector; there are court and real-time reporting credentials to work in jurisdictions, and captioning credentials to work in television stations (Rufino Morales, 2020). Regarding the TV type, respeakers and stenotypists are allowed to reformulate the original contents so as to keep up with the speech rate of the live soundtrack and not to miss important parts, and are also encouraged to add extra-linguistic data to provide an accurate description for deaf and hard-of-hearing viewers (Romero-Fresco, 2009).

At present, however, voice writing is conspicuously rare in Iberian countries. It may be found at some public events and conferences, though never in courts. Is there legislation in force that forbids this practice in the jurisdictional context? Or is it a matter of cultural aversion? Do Iberian deaf and hard-of-hearing citizens prefer observing a sign language interpreter in lieu of captions on screens? Besides, we should consider the future of respeakers on both sides of the Atlantic: is artificial intelligence (AI) a threat for such currently well-remunerated professionals?

2. Objectives and methodology

The paper presents the legal procedural frameworks in Portugal, Spain and the American State of California, which allow for or forbid the presence of respeakers, known as voice writers in the United States. Considering the variety of legislations in North America, only a single state has been chosen for the study: California. It is well-known for being home to large technological corporations and offering an advanced framework for labour and environmental matters, compared to the average standards of the nation.

Moreover, the analysis depicts the opportunities for implementing voice writing and the role of AI in the Peninsula's courtrooms, reflecting also on the drawbacks that automation might entail.

The methodology is based on the study of civil and criminal procedural rules that allow for or forbid transcripts and recordings of court hearings. Also, the analysis is based on scientific publications related to voice writing and the possible trends on automation. Qualitative content analysis and close reading permit identifying the relevant aspects to elaborate the inquiry properly.

3. Why voice writers are absent in Iberian courts

3.1. The case of Portugal

In Portugal, voice writers do not work at the judicial system. The reason is found, apart from the longstanding legal tradition of the country, in the Portuguese Code of Civil Procedure (Código de Processo Civil), approved by Law 41/2013, dated 26 June, which relies on audio and video recordings on article 155, entitled "Gravação da audiência final e documentação dos demais atos presididos pelo juiz" (article 158 in the 1961 Code of Civil Procedure). This precept states in the consolidated text that:

> 1 - A audiência final de ações, incidentes e procedimentos cautelares é sempre gravada, devendo apenas ser assinalados na ata o início e o termo de cada depoimento, informação, esclarecimento, requerimento e respetiva resposta, despacho, decisão e alegações orais.
>
> 2 - A gravação é efetuada em sistema vídeo ou sonoro, sem prejuízo de outros meios audiovisuais ou de outros processos técnicos semelhantes de que o tribunal possa dispor, devendo todos os intervenientes no ato ser informados da sua realização.
>
> 3 - A gravação deve ser disponibilizada às partes, no prazo de dois dias a contar do respetivo ato.

> 4 - A falta ou deficiência da gravação deve ser invocada, no prazo de 10 dias a contar do momento em que a gravação é disponibilizada. [...]

The text cited above establishes the use of audio-visual recordings at court hearings in the civil order and in relevant stages of the procedure, not excluding other technologies of similar properties, and guarantees the access to the contents by all the parties within two days after the celebration of the hearing. Before introducing a reform through Decreto-Lei n.º 97/2019, the original norm considered solely audio recordings, whereas other means were reckoned as additional. Subsequently, the precept specifies when the transcription of hearings occurs:

> 5 - A secretaria procede à transcrição de requerimentos e respetivas respostas, despachos e decisões que o juiz, oficiosamente ou a requerimento, determine, por despacho irrecorrível.
>
> 6 - A transcrição é feita no prazo de cinco dias a contar do respetivo ato; o prazo para arguir qualquer desconformidade da transcrição é de cinco dias a contar da notificação da sua incorporação nos autos.

As has been shown, the Portuguese civil order generates transcriptions when there are summons, their respective answers and significant court decisions that cannot be appealed. Transcriptions are produced within five days following the audience and the parties can reject them on the basis of inaccuracy for a short period.

Another relevant precept of the Portuguese Civil Code is article 640, section 2 (article 685 in the Code of Civil Procedure of 1961), which reads as follows in the consolidated text:

> [...] Quando os meios probatórios invocados como fundamento do erro na apreciação das provas tenham sido gravados, incumbe ao recorrente, sob pena de imediata rejeição do recurso na respetiva parte, indicar com exatidão as passagens da

> gravação em que se funda o seu recurso, sem prejuízo de poder proceder à transcrição dos excertos que considere relevantes;

After the court decision, any of the parties can make an appeal if they consider that it was not correctly founded on the factual evidence deployed during the audience. In order to show possible discrepancies, that party has to point out the precise moments of the recordings and is allowed to transcribe the significant passages.

In the Criminal order, the Portuguese system is based on audio-visual recordings. Contrasting with the above-mentioned civil provisions, the Penal order sanctions with nullity the hearings that are not recorded with such means; this is a logical guarantee when we consider the implications of certain sentences for the Human Rights of offenders and victims. More specifically, article 364, labelled "Forma de documentação", of the Code of Criminal Procedure (Código de Processo Penal, approved by Decreto-Lei n.º 78/87, dated 17 February 1987), establishes in its consolidated text:

> 1- A audiência de julgamento é sempre gravada através de registo áudio ou audiovisual, sob pena de nulidade, devendo ser consignados na ata o início e o termo de cada um dos atos enunciados no número seguinte.
>
> 2- Além das declarações prestadas oralmente em audiência, são objeto do registo áudio ou audiovisual as informações, os esclarecimentos, os requerimentos e as promoções, bem como as respetivas respostas, os despachos e as alegações orais.

This does not mean that transcriptions are never allowed; similarly to the civil order, the Judicial Secretary can reproduce requests and replies, as well as other decisions pronounced by the judge, and transcriptions must be done within a five days period (article 364, sections 4 and 5).

In short, an audio recording system prevails in Portugal, with transcriptions reserved only to specific cases requiring legal certainty and stability. The written records are

produced upon demand by the Administration of Justice or in certain cases in accordance with the interests of the parties.

3.2. The case of Spain

In Spain, a system of audio-visual recordings is the rule, and transcriptions are excluded on a general basis. The main argument is found in the Organic Law 6/1985, dated 1 July, on the Judiciary (Ley Orgánica del Poder Judicial), which is a fundamental rule of the Administration of Justice in the country and develops the related constitutional provisions. Article 230, paragraphs 3 and 4, establishes the following in the consolidated text:

> 3. Las actuaciones orales y vistas grabadas y documentadas en soporte digital no podrán transcribirse, salvo en los casos expresamente previstos en la ley.
>
> 4. Los procesos que se tramiten con soporte informático garantizarán la identificación y el ejercicio de la función jurisdiccional por el órgano que la ejerce, así como la confidencialidad, privacidad y seguridad de los datos de carácter personal que contengan en los términos que establezca la ley.

Paragraph 3 rules out transcriptions, as "Oral trials and hearings that are digitally recorded and documented cannot be transcribed, with the exception of the cases expressly stipulated in the law" (our translation). Identical stipulations may be found on the main procedural laws of the civil and criminal orders, as pointed out below (art. 147 of the Law 1/2000 and art. 743 of the Decree dated 14 September 1882).

The Permanent Committee of the General Council of the Spanish Judiciary adopted an Agreement on 19 April 2017, which confirms the exclusion of transcripts and reinforces the role of the Judicial Secretary, who is the head of the administrative office of each tribunal and has a public trust capacity; so this professional profile is equivalent to a notary ascribed in the Justice Administration and differs from most civil servants.

More precisely, on section 5-2 of the cited 2017 Agreement, the Permanent Committee provides instructions to the Ministry of Justice and the bodies of the autonomous communities or regions with competences on the Administration of Justice, so as to deploy adequate material and human resources that satisfy complete, accessible and reliable recordings:

> […] cada organismo, dentro de sus respectivas competencias, proceda a poner a disposición de los órganos judiciales los medios técnicos necesarios que posibiliten que las grabaciones recojan de manera absolutamente fidedigna, íntegra y completa las declaraciones, de manera que sea posible con sencillez y rapidez acceder a cualquiera de los contenidos con plenas garantías, y que los letrados de la Administración de Justicia, como titulares exclusivos de la fe pública judicial, procedan a supervisar que las grabaciones sean efectuadas con los oportunos puntos de control que permitan tanto al juez como al tribunal y a los abogados acceder con facilidad y agilidad al punto y momento que en cada caso precisen de la grabación efectuada para el ejercicio de sus funciones judiciales y profesionales, respectivamente.

All in all, the Permanent Committee considered that the transcriptions of the audio-visual recordings containing the interventions of witnesses and experts, from digital to paper support, are not in line with the Spanish legal system. This extreme position is intended to avoid discrepancies arising from the low quality or lack of accuracy of transcriptions.

In practice, however, the Judicial Secretary is often overloaded with different tasks and does not attend the hearings in person, nor does he or she visualise the recorded contents. Consequently, though this fact is not acknowledged by the General Council, that assignment is delegated to the civil servant working in the courtroom and in charge of activating and stopping the recordings, who is usually positioned at the lowest level of the

hierarchical scale of the Justice Administration and does not have the qualifications to perform such public-trust duties. When assessing the challenges and opportunities of automation, we will return the figure of the Judicial Secretary to discuss who can take over the responsibility for supervising the interventions of algorithms.

Legal provisions on audio-visual recordings during the hearings in the civil order are set more precisely in Law 1/2000, dated 7 January, of Civil Judgement (Ley de Enjuiciamiento Civil). On article 146, section 2, the consolidated text states that:

> Cuando la ley disponga que se levante acta, se recogerá en ella, con la necesaria extensión y detalle, todo lo actuado. […] Si se tratase de actuaciones que conforme a esta ley hayan de registrarse en soporte apto para la grabación y reproducción, y el letrado o letrada de la Administración de Justicia dispusiere de firma electrónica u otro sistema de seguridad que conforme a la ley garantice la autenticidad e integridad de lo grabado, el documento electrónico así generado constituirá el acta a todos los efectos. [...] el acta se extenderá por procedimientos informáticos, sin que pueda ser manuscrita más que en las ocasiones en que la sala en que se esté celebrando la actuación careciera de medios informáticos.

It is worth pointing out here that audio-visual technology plays the main role when recording the proceedings, and the manuscript techniques may only be used if the appointed courtroom is not fitted with the necessary means, which is quite an extraordinary occasion. Similar provisions are established in article 147 of Law 1/2000:

> Las actuaciones orales en vistas, audiencias y comparecencias celebradas ante los jueces o magistrados o, en su caso, ante los letrados de la Administración de Justicia, se registrarán en soporte apto para la grabación y reproducción del sonido y la imagen.

The above-cited paragraph defines the Judicial Secretary's responsibility for the authenticity and integrity of audio-visual recordings. However, as this civil servant normally

does not attend the hearings, the legislator admits that circumstance by acknowledging that the presence of the Judicial Secretary is not mandatory:

> […] la celebración del acto no requerirá la presencia en la sala del letrado o letrada de la Administración de Justicia salvo que lo hubieran solicitado las partes, al menos con dos días antes de la celebración de la vista, o que excepcionalmente lo considere necesario el letrado o letrada de la Administración de Justicia […]

A curious aspect is that Real Decreto-Ley 6/2023, dated 19 December, has introduced a new paragraph, according to which the "Judicial Office" is responsible for attaching the audio-visual recording in the electronic case-file consigned to the servers of the Justice Administration; this opens the door to assigning responsibilities to civil servants that may not discharge this duty correctly and partially exempts the Judicial Secretary from liability: "la oficina judicial deberá asegurar la correcta incorporación de la grabación al expediente judicial electrónico".

When assessing the penal order, the fundamental provision is found in article 743 of the Royal Decree dated 14 September 1882 (Ley de Enjuiciamiento Criminal), which was amended by the already-mentioned Real Decreto-Ley 6/2023, dated 19 December, in order to attain a provision equivalent to that of the civil order. In its consolidated form, this precept states:

> El desarrollo de las sesiones del juicio oral y resto de actuaciones orales se documentará conforme a lo preceptuado en los artículos 146 y 147 de la Ley de Enjuiciamiento Civil. La oficina judicial deberá asegurar la correcta incorporación de la grabación al expediente judicial electrónico. […]

Thus, the Spanish law expressly mandates that civil and criminal hearings cannot be transcribed.

4. The US framework for court reporters. The case of California

In the United States of America, court reporters, also known as real time reporters, participate in the Administration of Justice as voice-to-text converters. Right now, such human intervention is in most States the sole certified methodology that produces official records of the judicial processes and can be consulted by litigants if they want to appeal the resolutions. Audio recordings were introduced in the 1990s in some areas, like Kentucky, to reduce costs and, according to some positions, reduce misunderstandings and misheard words. However, other experts point out that court reporters have the capability to stop the hearings to clarify the message so as to avoid mistakes; they may also require clarification when words are muttered or something is not explained in words, which audio recordings cannot capture (Etulle et al., 2023).

As court reporters are present in the hearings, their transcripts may be consulted right away by barristers and judges, and the deaf and hard-of-hearing citizens in attendance may watch the captions on screens and participate when so requested or allowed. Court reporters earn an average income of 60,000 dollars per year, and eventually more if they obtain supplementary certifications (National Court Reporters Association, 2024).

As the United States is a large country, the present paper focuses on only one state, California, which is well known for its technological advancements and the existence of a more developed legislative corpus in what concerns labour and environmental matters, at least when compared to the national American average.

The so-called "Golden State" has recently modified its laws to allow the work of professional voice writers or respeakers, to make up for the scarcity of stenotypists. As pointed out in the introduction of this paper, highly skilled stenotypists are hard to find, as at least three to four years of intensive training are necessary to become competent.

The Californian Code of Civil Procedure defines the tasks of "phonographic reporters" in articles 269 to 274a. These professionals shall "take down in shorthand all

testimony, objections made, rulings of the court, exceptions taken, arraignments, pleas, sentences, arguments of the attorneys to the jury, and statements and remarks made and oral instructions given by the judge or other judicial officer", in the civil cases if the court orders it or if they are requested by a party (art. 269). In addition, official reporters must deliver the transcripts in electronic form, unless they are required to furnish them in paper format (art. 271). Transcripts by official reporters, duly appointed and sworn, are considered valid evidence in courts after they are "certified as being a correct transcript of the testimony and proceedings in the case", (art. 273).

The Assembly Bill no. 156, approved by the Governor of California on September 27, 2022, amended Section no. 8017 *et al.* of the Business and Professions Code, located in the Division 3 and in Chapter 13 of the Code. This bill introduced voice writing or respeaking in Californian courts. The consolidated legal text has been adapted as follows:

> The practice of shorthand reporting is defined as the making, by means of written symbols or abbreviations in shorthand or machine shorthand writing, or by voice writing, of a verbatim record of any oral court proceeding, deposition, court ordered hearing or arbitration, or proceeding before any grand jury, referee, or court commissioner and the accurate transcription thereof. Nothing in this section shall require the use of a certified shorthand reporter when not otherwise required by law.

The cited Assembly Bill also established a legal definition of voice writing to be introduced in section 8017.5 of the Business and Professions Code, which is interesting to examine. According to the Administration of California, voice writing is "a verbatim record or a proceeding using a closed microphone voice dictation silencer, steno mask, or similar device using oral shorthand and voice notes made by a certified shorthand reporter". Here, there is no mention of the software used for the voice recognition process, so we can infer that the description may be applied to the first voice writing techniques pioneered by Horace Webb in Illinois. Most of the laws are designed to last and here is a case that can be

adapted to a lack of VR technological means. The Bill also fixed the requirements to become court reporter via voice writing by modifying section no. 8020 of the Business and Professions Code.

5. Voice recognition, algorithms and the future of voice writers

5.1. Estimations of redundancy of court reporters

After 2008, the so-called "Great Recession" brought uncertainty to labour expectations in most of the developed world. Peripheral economies in the Eurozone suffered the effects of economic adjustments, and the adoption of technological means met some distrust. According to several studies, employment rates did not grow until the middle of the 2010s. During this difficult period, a seminal paper conducted by Carl Benedikt Frey and Michael Osborne (2013) discussed the impact of automation on employment and introduced significant concerns about the future of labour in Western countries, by analysing the probabilities of automation of US jobs among a list of 702 professions. Overall, these researchers estimated a high risk of automation for 47% of US jobs over a 10-20 years' timeframe. When looking closely to the list of occupations of the inquiry classified from low to high risk levels, court reporters appeared in the 301st position, with an average probability of becoming automated of 0.50.

It may be argued that a study conducted more than a decade ago and in another country is not a reliable measure for European patterns. In 2019, professors Grace Lordan and Cecily Josten provided estimations for the EU and 25 member countries. Interestingly, though using a different methodology and timeframe, they reached similar conclusions as Frey and Osborne: 47.4% of EU jobs would be "automatable" within the next decade, and among them 35% of occupations were "fully automatable" (Lordan and Josten, 2019).

These authors, however, pointed out that the study was based on a static model; this means that the introduction of technology is followed by an adaptation of labour via

reskilling; also, the consumption of goods and services might grow, and neither circumstance can be covered in the analysis. At the national level, they estimated a risk of automation in Portugal of 48.5% of jobs and 47.4% in Spain. Looking at the classification of occupations used in the inquiry, "editors and reporters" were placed in the same category and classified as "non-automatable" jobs.

The emergence of artificial intelligence and the post-Covid world order requires de adoption of an updated perspective. For the first time in history, high-skilled employment in a general sense is at risk due to the advent of a single innovation. In 2023, generative AI (GenAI) showed that it is possible to produce new contents in literature, high-quality videos and superb images by using an extensive database and almost no human intervention. Creativity right now is not an exclusive domain of human beings; in addition, human beings are usually puzzled by technology and can fall prey to elaborate schemes. If GenAI has reached the point of performing creative tasks, it is quite obvious that most of the tasks developed by court reporters are now automatable, as they involve acoustic and linguistic perceptions and AI has vast sources to be trained.

According to a study carried out under the auspices of OECD in 2023 that surveyed more than 5,000 employees in seven member states, 20% of the respondents working in finance and 15% in manufacturing mentioned that they knew someone in the firm that had been made redundant due to the introduction of AI. Moreover, similar percentages of respondents from those sectors expressed their fear of losing their jobs within a 10-year period (Lane, Williams and Broecke, 2023).

In the same year, a study funded by Goldman Sachs (Briggs and Kodnani, 2023) estimated that 300 million full-time jobs were at risk worldwide. In the US and Europe, GenAI could replace up to one-fourth of the current employment in the next few years. Notwithstanding the expected impact, researchers consider that the rise in productivity for

the non-redundant workers may boost the annual GDP and have positive outcomes in terms of welfare.

In January 2024, the International Monetary Fund published a report estimating the impact of GenAI (Cazzaniga et al., 2024). According to this document, developed economies run a larger risk as they have more cognitive-based occupations, with about 60% of jobs highly exposed to AI. These estimations, however, do not necessarily imply negative outcomes in every case. Although the IMF researchers suggest that 33% of jobs will be severely affected as there is a "low complementarity" between workers and AI, 27% may actually enhance their productivity due to "high complementarity" with the new technology. Low-income countries, in contrast with more developed economies, will see a much lower impact of AI, affecting 26% of labour posts, but this theoretical advantage may lead to a wider income and welfare gap in the long run, when compared to post-industrial societies.

In this uncertain scenario, it is clear that the development of digital skills is paramount in order to maintain the competitiveness of individuals and countries, and lifelong and online learning resources must be established by governments and private institutions; for example, Google is offering online courses in data analysis, open to all those interested in the issue with a basic knowledge of computer science (Riesco del Río, 2023).

5.2. Algorithms in Californian courts?

At the time when California introduced voice writers in the State's courts, the authorities also began to consider diverse ways of enlarging the limited collective of court reporters. Among other measures, they contemplated monetary incentives, scholarships, remote work and "innovative technologies" (Proctor, 2023), i.e., voice recognition

algorithms. Right now, the latter option is not allowed by the law, but it remains to be seen whether legislators will keep the same position in the next few years.

Nevertheless, voice recognition software is currently a useful tool for respeakers and the technology is steadily improving due to the contributions offered by the professionals themselves. In the near future, furnishing data to a personal working profile stored in a single computer, as performed by the Dragon software, will no longer be necessary. Instead, data will be recorded at a large scale, and a single algorithmic processor, trained with millions of voice samples, will be capable of identifying the nuances of multiple "first-instance" speakers without a long period of individual training centred on a "second-instance" speaker (in other words, a respeaker or voice writer). For example, smartphone voice assistants managed by large technological corporations, also headquartered in California, are currently creating speech profiles of end users, and their precise knowledge can be easily transferred to algorithmic general models destined to operate in courtrooms.

All in all, in this dark scenario for human court reporters, it is worth pointing out that the adoption of technology may liberate them from unhealthy outcomes caused by repeated movements or activities: stenographers suffer from hand and finger conditions, like the carpal tunnel syndrome, and voice writers drink more water than the average person to keep the pharynx and throat appropriately moisturized (Proctor, 2023) and avoid difficulties in respeaking. Moreover, voice writing requires a significant cognitive effort and pauses are recommendable every 30 minutes, so speech-to-text interpreters take turns on a general basis, for example in academic conferences (Szczygielska et al., 2020); the introduction of AI may reduce the need for such pauses, as the workload becomes more manageable for a single professional.

The advent of algorithms can redefine the role of court reporters, displacing them out of the current speech-to-text intermediary (and active) position. Though they are currently the bridge between the spoken output and the transcripts, they may become

content verifiers or post-editors of the automated outcomes, so as to ensure the accuracy and authenticity of the transcriptions. This is a task that algorithms will have difficulties in tackling, in addition to concerns about liability if the entire process is handled by a machine – who will be held liable in case the text is incorrect? "Responsibility" is a concept that technology at the moment cannot assume in the full sense, and engineers behind them proceed with extreme caution in this regard, possibly following the advice of well-informed lawyers. Court reporters are likely to remain in the courtroom for at least another twenty years, but the attractiveness of their job will fall in the same proportion as their salary, as the task will no longer require the development of advanced skills.

Until then, however, the National Court Reporters Association proudly insists in its website that professional members are "educated", "cost-effective" and "high-tech", as, among other advantages, they bring their own electronic devices to the courts and are responsible for updating their software, therefore freeing the Administration from a significant financial burden.

6. Concluding remarks

In this paper we have observed the differences between the United States and the Iberian Peninsula regarding the figure of voice writers or "respeakers" in courtrooms. This professional profile has been present in the United States since its introduction by the 1940s pioneers and has been reinforced in that nation for the past two decades, coinciding with a sustained technological progress that has permitted outstanding advancements in voice recognition systems that attain a degree of precision comparable to that of stenotyping and without needing much training.

In contrast, Spain shows an "anti-transcript" model: audio-visual records are essential and the law forbids the textual reproduction of hearings on a general basis. The Spanish judicial system relies on the principle that fidelity requires adjusting closely to the source.

On the other hand, Portugal's position is more moderate, at least in the civil and criminal jurisdictions; audio-visual recordings are the main registered contents but transcriptions of relevant phases in the hearings are allowed by the civil and criminal procedural laws. None of the Iberian countries has reporters working in the courts, whether respeakers or stenotypists.

But artificial intelligence is shaping (and shaking) the tasks of US voice writers, and will continue to do so in the years to come. In the next decade, courtroom respeakers in the US will tend to become content verifiers or post-editors, as AI will be able to perform most of the interpreting tasks at a lower cost. Of course, the health of court reporters will improve, but the job will be far less stimulating and salaries will certainly be affected. After this "algorithmic wave" that is sweeping over the current 2020s, AI may be sufficiently trained to surpass most of the existing professionals in terms of nuance detection and speed. And it will be trained by voice writers themselves, which is certainly daunting. However, court reporters may still have something that technological corporations are trying their best to avoid, which is the notion of "responsibility".

The Spanish procedural requirements that currently ban transcripts may become more similar to the Portuguese model, with transcriptions allowed at certain stages of the process. Also, as technology becomes even more sophisticated, courtrooms may offer real-time transcripts that could be activated on a free choice basis. Consequently, while audio-visual recordings will continue to be as commonplace as now and their importance will not be lessened, automatic captions may render the hearings more accessible for all. After each hearing, civil servants, lawyers and the parties may have easy access to the textual reproductions stored in the server of the Justice Administration and under the symbolic custody of the Judicial Secretary.

The current proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence, known as the "Artificial

Intelligence Act", does not seem to be incompatible with introducing speech-to-text interpreting algorithms in EU courtrooms. The draft text of Article 5, which classifies the prohibited AI practices, does not include analogous facts. Technology moves at a fast pace and Europe is now in a critical junction to decide, under an informed and democratic basis, which perspective shall be taken for the future.

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