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BUILDING LINGUISTIC CORPUS FOR VERBAL LIE DETECTION: ADVANCING CRIMINAL INVESTIGATIONS THROUGH NEURO-LINGUISTIC TECHNIQUES

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Abstract
Lying is a global phenomenon that everyone encounters in everyday life, as it significantly affects communication. This study aims to develop a mini specialized speech-to-text corpus for deception detection in criminal investigations. Furthermore, it assesses the use of neuro-linguistic programming techniques in Pakistani courts, as well as their effectiveness in detecting deception through technologies such as machine learning, Python, and natural language processing. This research also identifies the linguistic markers of trickery to support decision-making in the Pakistani legal system. A mixed research approach is employed to achieve these objectives, incorporating exploratory research and quasi-experimental research. The linguistic corpus is collected from primary and secondary sources, including the accused, suspects or criminals, spectators, complainants, and witnesses who are questioned by police officers, lawyers, or inspecting journalists, selected using convenience and purposive sampling techniques. The primary source consists of data from the session court, where legal proceedings are included for observation of neurolinguistic technique, while the secondary source is obtained from public legal content on YouTube, such as the 'Pukar' media program. The corpus contains 10,360 words from legal cases related to murder (Section 302) and violence (Section 376), featuring both male and female speakers. The result shows that truthful sentences are simple in structure, while liars create complex sentences during speaking. The result concluded that the neurolinguistic technique is an effective method to detect lies, as it gives the required results within a limited time. Furthermore, the analysis shows that direct elicitation, emotional trigger, accusation/challenge, and accusation/pressure on the brain are the best techniques for disgorge of truth. Whereas role, or framing of identity, Wh-questions, and direct elicitation of NLP techniques are best for lie detection.
Key Terms: Neuro-Linguistic Programming (NLP) technique; spoken-to-text corpus; deception detection; machine learning; Python; natural language processing

1. INTRODUCTION

Lying is a universal behavior of humans that appears not only in criminal situations but also in our everyday lives, such as in politics, family gatherings, workplaces, and friendships. Pamela Meyer is the author of a book related to lie detection techniques, said in her TED Talk that we speak lies 10 to 200 times in a single day, so it makes it difficult to detect when a person is speaking a lie (Tovmasyan, 2020). This process of human lie detection involves determining the genuineness of a statement. As liars use verbal strategies in deceptive narratives. The liars' purpose in using this deceptive approach is to generate false impressions in others.

This subject is frequently measured in forensic and legal circumstances (Vrij et al., 2022). Many researchers have examined how well humans can spot lies or truthful statements, but the accuracy over 60% is rarely observed (Vrij, 2000), which means that researchers have only improved slightly from guessing over several years (Bond & DePaulo, 2006). The reason for poor performance is that lie detectors tend to assume others are speaking the truth, which is known as truth bias. This is the reason that lie detectors are better at noticing truth rather than lies, a phenomenon referred to as the "veracity effect" (Levine et al., 1999) but a study challenged this result and showed that before discriminating between lies from the truth, individuals rely on the most accurate cues, like detail in a story, through

which they can get accuracy from 59 to 79 percent.
The methods for lie detection are changing in the legal field. For this reason, the criminal justice system uses various techniques for interrogation and interviews. The primary objective is to determine the veracity of the suspects through behavior. Moreover, it differentiates between a criminal and an innocent person. One such method is Neurolinguistic Interviewing Techniques (henceforth NIT), also known as Neuro-Linguistic Programming (henceforth NLP). These techniques are based on vocal and body language cues (Tucker, 2019). The purpose of using this method is to expose the basic human behavioral patterns.

2. LITERATURE REVIEW

Crime is a worldwide problem. For this purpose, people are concerned with the indicators of dishonesty in several fields by examining physiology, non-verbal, para-verbal (tone, pitch, voice pace), and verbal behaviors (Hauch, Gitlin, Masip, & Sporer, 2015). Crimes are spreading gradually in Pakistan, highlighting the reasons for conducting this research to advance the decision-making method. Law enforcement officers are concerned with discovering the falsehood of the accused (defense counsel), suspects or criminals, the prosecution side (the complainant), and witnesses in criminal cases. For this reason, law enforcement agencies reach out to different scientists and researchers to help them improve the criminal justice system.
Loconte, Russo, Capuozzo, Pietrini, and Sartori (2023) worked on deception detection through spoken data to improve the large language model and to identify true and lie statements from the previous methods. Secondly, it helps to detect new lies from false narratives. Thirdly, the diversity of data expands performance across contexts and helps the model to make better predictions. Lastly, huge data models improve accuracy. It investigates how well an LLM, specifically FLAN-T5, to detect lies in three English data records, i.e., autobiographical memories, personal opinions, and future goals or intentions. For this purpose, language differences in three English datasets using declarative stylometric analysis were analyzed. After that, the researchers tested FLAN-T5 in three ways using 10-way cross-validation, in which training and testing are performed on the same dataset. Secondly, two datasets were used as training, and the third as testing on all three datasets together. The best results were achieved in the first and third situations, which broke the previous records. The outcomes showed that the model's performance is enhanced with a larger size. The results showed that the model's predictions are affected because language features are connected to the cognitive load framework.
Panggabean, Sinar, Susanto, and Setia (2018) discussed interview strategies with suspects during interrogations in forensic linguistics to explore the use of different question types in interrogation interviews with suspects and to outline strategies used to elicit truthful and useful information. Additionally, it examines the effectiveness of questioning techniques in uncovering facts when physical evidence is weak. A qualitative descriptive approach was employed for textual analysis. The data were collected from actual interviews conducted between police investigation officers and suspects in Indonesia. The cases involved Palm rubbing and persecution, and the researcher examined two cases with recorded spoken interviews and observations. Later, the verbal conversational data were transcribed into written form by categorizing the questions into different types, including directive questions, open-ended questions, closed-ended questions, and reflective questions. The study concluded that choosing the right questioning technique is essential for obtaining truthful and useful information.
Leech et al. (2009) checked the reliability of the lie detection performance to determine whether people can detect lies consistently over time and under different situations, such as kids versus adults, real versus fake lies. For this purpose, participants watched videos for the detection of lies and truth from children versus adults, and they did this task in two sessions, by taking a week's gap between them. They used different scenarios of lies in which yes/ no answers, full stories, and real versus fake lies are included. Finally, the results concluded that most people are not good at detecting lies, and their performance is close to guessing. The outcome was reliable when children's short answers in the form of yes/ no were judged, but in other cases, the output was not reliable in the case of judging the adults or full stories.

There is a contextual gap because previous studies were done in Western contexts, such as Bond and DePaulo (2008) and Leech et al. (2009), but verbal lie detection by using NLP techniques in the Pakistani Legal context, particularly in the Urdu language, is not present. Secondly, the methodological gap is present. The previous methods are not enough to give accurate and improved results, so a new method is required for better results (Robinson et al., 2011; Muller-Bloch & Kranz, 2015; Miles, 2017). Lab-based experiments were conducted, but this does not replicate naturalistic truth and lies in a criminal setting. Furthermore, past studies used isolated techniques to detect truth or lies, such as stylometry, ML models, etc. Still, this study combines computational intelligence and linguistic cues by combining them in a single context. An empirical research gap is found when the research findings are not tested on real data (Robinson et al., 2011; Muller-Bloch & Kranz, 2015; Miles, 2017). So, there is no lie detection pattern analysis in South Asian languages, particularly in the Urdu language. This research extracts linguistic cues based on a data-driven approach that is not present in previous research. Lastly, a practical or application-based gap is also present (Robinson, et al., 2011, Muller-Bloch, & Kranz, 2015; Miles, 2017), as in the earlier studies, humans detect truth and lies, and their results are not better than chance level, but this research is using computational tools for lie detection of criminals and this improves court trials and interrogation processes.

3. METHODOLOGY

This research employs mixed-method research. For this purpose, data are collected from primary and secondary sources, including the accused (defense counsel), suspects or criminals, and the complainant (prosecution). This data serves as a reliable basis for analyzing neurolinguistic techniques used in court. It was observed that courtroom conversations are very limited in length and content, making analysis challenging. Additionally, the decision-making process requires time to distinguish between truth and lies. No audio or video recordings of cases exist where such distinctions can be identified. The reason for not using written court documents for linguistic analysis is that, first, court records are in English, but only a few documents are in Urdu. For secondary data, social media platforms like the "Pukar" program are used, where journalists interview criminals. All data are collected in video format for linguistic analysis. The reason for choosing this program is that it features media journalists asking questions to suspects or criminals using neurolinguistic techniques similar to those in courts, and witnesses or complainants narrate their stories, as in court proceedings. Moreover, these conversations are detailed and portray real-life criminals, not dramatized stories.

The population is categorized into three categories: criminal, suspects or accused with neurolinguistic techniques, whereas, witnesses as complainant, neighbors without neurolinguistic techniques in the form of experience-based narration, and media reporters, lawyers, and police officers as trained professionals who ask questions by using different techniques with a criminal or suspect who is hiding information or giving general answers, and NLP techniques pushes the suspect to reveal the truth. The nature of the data is from spoken-to-textual data without fixed limitations for this research.

The purposive and convenience random sampling techniques are used to intentionally select crime cases according to the nature or set criteria, such as violence and murder cases, for linguistic analysis of the Urdu language, both with and without the neurolinguistic technique. So, the accused or suspect's statements are selected purposefully. While in convenience random sampling, the sources of data depend on accessibility. In this way, the sampling technique provides flexibility to the researchers.

Neuro-Linguistic Programming (NLP) provides a theoretical as well as conceptual framework for this research. It was introduced by Richard Bandler and John Grinder (Pishghadam & Shayesteh, 2014). It is a sentence-based and psychological approach to understanding how individuals think, talk, and feel, and in what way it affects their lives. Its importance depends on addressing lexicological, phonological, semantic, syntactic, and pragmatic aspects of language. Using lexical and syntactic layers, the researchers can understand the cognitive processes and interpersonal skills involved in managing relationships with others.

These YouTube videos were downloaded using the online y2mate.com website. The conversations were transcribed from spoken format into written form by using an app called 'Live Transcribe,' where spoken words are transcribed in Urdu, and it saved time and effort. Since previous research used different techniques to process the data, such as the AI-powered 'TurboScribe' tool and 'Google Docs,' it converts some Urdu data correctly, but the researcher mostly manually corrected the words, which is a time-consuming process (Qadir, Iqbal, and Junaid, 2024). This process is not done through Python coding because that does not give accuracy in the data and takes much time to correct the data.

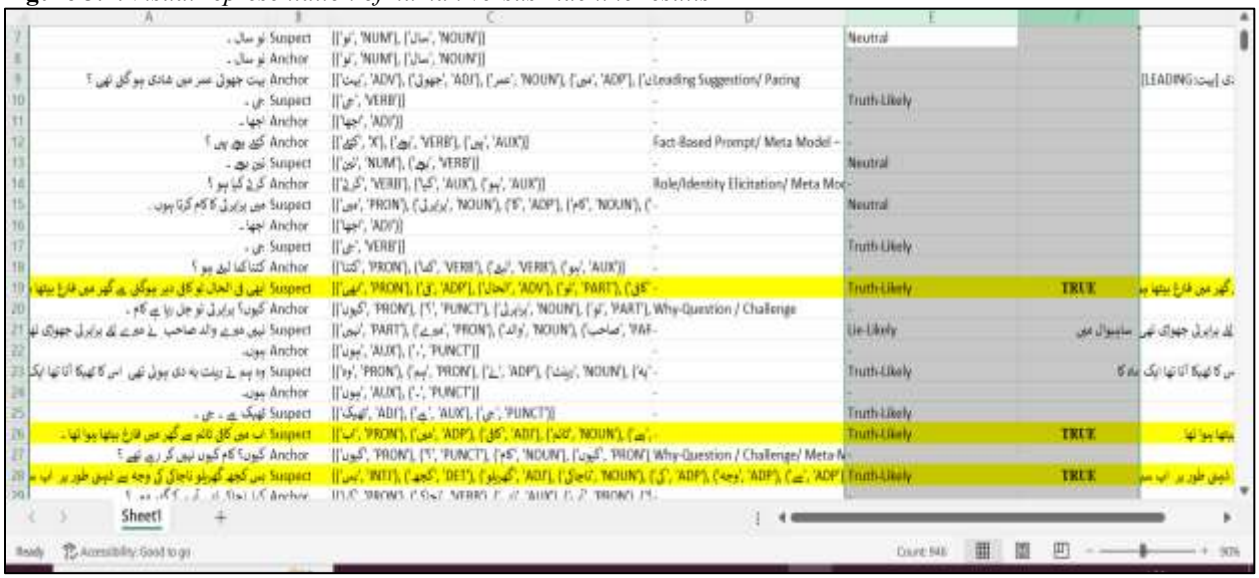
In the preparation phase, the researcher did a tokenization process of unstructured data, in which the data was labeled according to the utterances as reporter/ anchor, suspect/ criminal, police officer, witnesses, etc. Punctuation marks were added to mark the sentence boundaries in the turn-taking process on the Excel sheet for analysis.

After that, 10,360 words in these interviews were categorized into two categories i.e., without using NLP techniques and those with NLP techniques used by law enforcement officers, i.e., lawyers, and used by media anchors or reporters in the 'Pukar' program. It is quasi-experimental research in which control and experimental groups are used to see the influence of NLP on deception detection. The accused's (defense counsel), suspects, or criminals' responses are analyzed with neuro-linguistic techniques in this study because it is in the form of questioning. The research took 414 turns for asking questions, in which neurolinguistic techniques were used with 409 suspects or criminals' answers. Whereas without the neurolinguistic technique, researchers used 104 turns in which questions are asked without neurolinguistics, and sometimes, it is in the form of a narrative, and the number of anchors' dialogues is 121. The turns contain long narrative sentences, which is why it is shown as limited, but in reality, the data is not. Moreover, the statistics of these rows with NLP and without NLP were extracted using Python.

The cases were taken equally based on the type of case, that is, violence and murder. Mostly, violence cases contain murder cases, so the researcher took cases in which murder and violence were also found. The purpose of equal division is to balance the representation of each case.

Firstly, truth and lie statements were identified manually by the researcher in the criminals as well as in witnesses, complainants' data, by using evidence, and by focusing on the detailing of similar statements of the criminal and witnesses in all sources of data. then the results of the machine learning were compared for accuracy. The purpose of this manual verification give more accuracy and reliability to the results. The comparison showed that Python analysis mostly gave accurate results, as shown in Figure 3.1

Figure 3.1. *Visual representation of human versus machine results*



In the E column, automatic detection but in the F column, manual detection is shown. For clarity, the research highlighted the sentences in yellow. This process is also done on data with the neurolinguistic technique, and then the process for lie and truth detection is also done on the data without NLP techniques manually, and then through a machine. After that, the results are compared and show that the machine gave better results compared to humans. The visual representation of data after comparison of truth and lie identification on data without the NLP technique, in which witnesses', anchor, lawyer, and complainant's data were present as shown in Figure 3.2

Figure 3.2. *The Visual representation of truth and lie identification on data without the NLP technique.*

In the fifth stage, linguistic and statistical analyses were accomplished by categorizing types of neurolinguistic techniques in questions as relevant, irrelevant, and leading questions through rule-based matching, shown in Figure 3.3

Figure 3.3. *Types of NLP questions through computational rule-based matching*

This process is done by using SpaCy Natural Language Processing pipelines, through Python coding mentioned in Figure 3.4

Figure 3.4. *SpaCy natural language processing pipelines for types of NLP questions.*

```
# Function for NLP-based behavioral analysis
def detect_patterns(text):
    doc = nlp(text)
    matches = matcher(doc)
    detected_labels = set()
    for match_id, start, end in matches:
        label = nlp.vocab.strings[match_id]
        detected_labels.add(label)
    return detected_labels
# Define enhanced keywords for question type detection
question_patterns = {
    "IRRELEVANT": ["ذہنی کیفیت", "معمولی", "پس منظر"],
    "RELEVANT": ["تفصیلات", "جرم", "حالات"],
    "LEADING": ["کیا یہ درست ہے", "نہیں", "ہاں", "کیا"]}

# Function to detect question type
def detect_question_type(question):
    question = question.lower()
    for q_type, keywords in question_patterns.items():
        if any(keyword in question for keyword in keywords):
            return q_type
```

Secondly, sub-types of NLP techniques in each question from the anchor's statement. NLP technique in the Urdu language was defined manually from the data, and then the automatic detection was done by using the computational equation of this technique, as shown in Figure 3.5

Figure 3.5. *Computational equation of the NLP technique.*

Equation:

$$Type(q) = \begin{cases} IRRELEVANT & if\ \exists\, k \in K\_irr \ \wedge\ k \subseteq q \\ RELEVANT & if\ \exists\, k \in K\_rel \ \wedge\ k \subseteq q \\ LEADING & if\ \exists\, k \in K\_lead \ \wedge\ k \subseteq q \\ UNKNOWN & otherwise \end{cases}$$

- q = *the question text*
- $K_{irr}, K_{rel}, K_{lead}$ = *sets of keywords for each category*
- $k \subseteq q$ = *keyword k appears in the question*

Equation

$$NLP(q) = \{Tj \mid \exists k \in Nj \wedge k \subseteq q\}$$

- $NLP(q)$ = *set of detected NLP techniques in question (q)*
- Tj = *type of neurolinguistic techniques, such as anchoring, reframing*
- Nj = *keyword for that particular technique*

If no technique is present:

$$NLP(q) = \{NONE\}$$

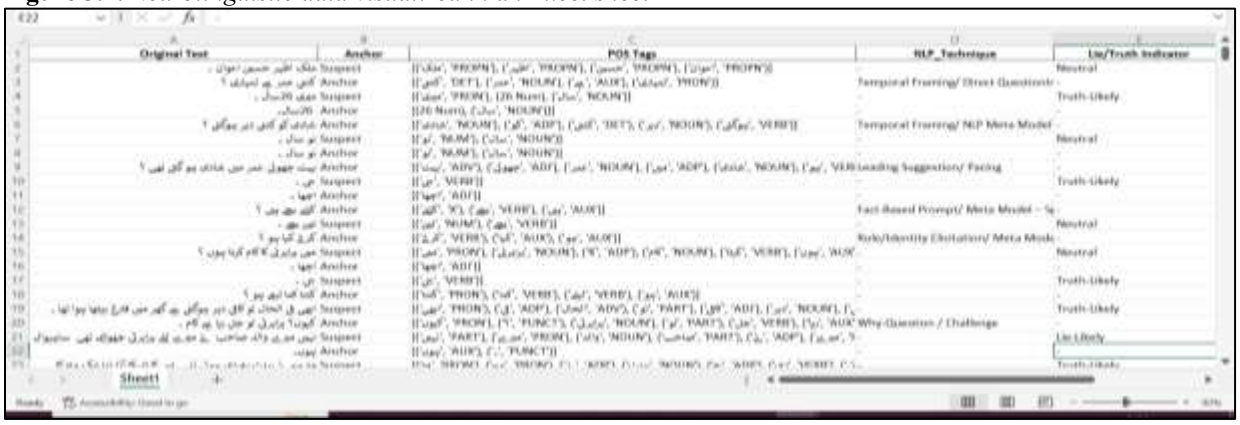
The researcher manually compared the technique marked by the machine to see the differences, as well as from accuracy of the data. The comparison showed that Python analysis mostly gave accurate results. These steps help the researcher in fulfilling the first objective, which explores the NLP techniques used in court trials in Pakistan.

After that, the researcher identified the part of speech (henceforth POS) of the linguistic data. Part-of-speech tagging was executed using the Stanza Python natural language processing library to identify linguistic features. The visual representation of parts of speech tagging is shown in Figure 3.6

Figure 3.6. *Visual representation of POS tagging*

Uptill now, the neurolinguistic data have been visualized in an Excel sheet, which is presented in Figure 3.7

Figure 3.7. *Neurolinguistic data visualized in an Excel sheet*



In this step, POS tagging was also accomplished on the data without the NLP technique, in which the witness's story form data was present. This POS process is helpful for the indicators of deception with their frequencies from criminals' data in further analysis.

After that, grammatical structures of truthful and deceptive statements were analyzed, such as simple, compound, complex, and compound-complex. The research then counted the structure of truth and lie sentences in statistics

In the extraction of truth and lies cues from the data, keywords and phrases were extracted from answers to the questions in which neurolinguistic techniques were used. Along with that, keywords, phrases used in NLP techniques were also highlighted. The visual representation of the truth and lie keywords in the data of the NLP technique 3.8

Figure 3.8. *Extraction of keywords and phrases as truth and lie cues from the data*

After that, keywords and phrases were also extracted from the data using a machine learning model, along with their

frequencies. Lastly, the results of data by the researchers to see the effectiveness of the NLP technique.

4. DISCUSSION

In the age of Neurolinguistic Programming (NLP), research in this field remains limited, especially from Pakistan's criminal justice perspective. Recent studies indicate that NLP techniques have slightly improved police investigations in lie detection beyond chance levels (Tucker, 2019). These NLP methods aid in uncovering the truth from individuals who have committed societal misconduct, significantly enhancing the resolution of investigations (Sandoval & Adams, 2001). When someone lies, specific emotional responses are evoked (Loconte et al., 2023; Walczyk, 2014), which can manifest as observable cues in speech. Neuro-linguistic techniques can help provoke or detect these cues. For the accomplishment of the first objective, the analysis of neurolinguistic techniques used in Pakistani courts is mentioned with examples.

Use of Neurolinguistic Techniques in Pakistani Courts:

Technique # 1

Detail Omission Challenge:

The purpose of this technique is to highlight details that are hidden or deleted, making them appear doubtful. Through the answer, the witness accepts the omission of the detail. In this way, the lie of the person is detected, and the person speaks the truth, as an example is mentioned.

Example:

آپ نے *یہ کیوں درج نہیں کیا* کہ علیشبہ نے آپ کے ساتھ کہاں اور کس وقت تفتیش میں شمولیت " اختیار کی؟"	**دفاعی وکیل**
/a:p ne *je kju: ɖərd͡ʒ nəhĩ: kɪja:* kɛ əliʃba: ne a:p ke sa:ʈ kəhã: ɔ:r kɪs ʊəqʈ ʈafʈi:ʃ me: ʃu:mʊlɪʈ ɪxʈja:r kɪ/	**IPA Transcription**
میں نے اپنی کیس ڈائریوں میں *یہ نکر نہیں کیا* کہ علیشبہ نے میرے ساتھ کہاں اور کس وقت تفتیش " میں شمولیت اختیار کی ۔"	**گواہ**
/mɛ̃: ne əpni: ke:s ɖa:jri:jõ: *me: je zɪkər nəhĩ: kɪja:* kɛ əliʃba: ne mere sa:ʈ kəhã: ɔ:r kɪs ʊəqʈ ʈafʈi:ʃ me: ʃu:mu:lɪʈ ɪxʈja:r kɪ/	**IPA Transcription**

In this example, the phrase *یہ کیوں درج نہیں کیا* is used as a neurolinguistic technique to show the omission of the detail, and after that, the witness accepts it by answering *میں یہ نکر نہیں کیا*.

Technique # 2

Repetition

This technique plays an important role in neurolinguistic programming because the repetition and arrangement of the sentence's parts assist in achieving the goals. Moreover, it contributes to showing where behaviors are imitative and learned through exercise. (Wełyczko, 2016). It shapes a strong link among people that is known as rapport (Clabby, 2002).

Through this technique, the lawyer-built pressure and contradictions of the statements are represented in the witness statements.

Example:

پہلے آپ نے کہا کہ *آپ گھر کے اندر* تھے، لیکن اب کہتے ہیں کہ آپ نے باہر فائرنگ دیکھی۔ اصل میں سچ کیا ہے؟	**دفاعی وکیل**
pɛhle: a:p ne: kəha: ʈʰa: ke: a:p gʰər ke: ənɖər ʈʰe:, əb kɛhte: hɛ̃: ke: a:p ne: ba:hər fa:jərɪŋ de:kʰi:. əsəl mẽ: sət͡ʃ kja: hɛ?	**IPA Transcription**
میں گھر کے اندر تھا۔	**گواہ**
mɛ̃: gʰər ke: ənɖər ʈʰa:	**IPA Transcription**

Technique # 3

Leading Questions

One of the most common techniques used in Pakistani courts is leading questions (yes/no). The purpose of lawyers in asking leading questions is to elicit answers in accordance with their demands. Additionally, in trial courts, the time is limited; this is the reason that lawyers use this technique to get relevant answers in a stipulated time. The example of a leading question from murder cases in Pakistani courts is mentioned below.

Example:

اُس وقت اندھیرا تھا، اس لیے آپ قاتل کو *صاف صاف نہیں دیکھ سکے، درست ہے*؟	**دفاعی وکیل**
ʊs ʊəqt əndʱe:ra: ʈʰa:, ɪs lɪje: a:p qa:ʈɪl ko *sa:f sa:f nehĩ: de:kʰ səke, ɖərusʈ hɛ*	**IPA Transcription**
جی۔	**گواہ**
d͡ʒi:	**IPA Transcription**

The phrase ***صاف صاف نہیں دیکھ سکے، درست ہے*** is used as a neurolinguistic technique that gives pressure to the witness

to agree to the statement, and due to this phrase, the witness accepted the statement.

Technique # 4

Suggestive Questioning / Presupposition:

It is a technique that indicates that a particular part should be specified in the answer to that question (Crisp,1957; Copeland, 1998) or incorrectly presents an assumption in the question as a believed circumstance (Loftus, 1996; Holah, 2010).

Example:

"کیا آپ نے جان بوجھ کر جھوٹا بیان دیا ہے؟"	**دفاعی وکیل**
/kɪja: a:p ne d͡ʒa:n bu:d͡ʒ kər d͡ʒʰu:ʈa: bəja:n dɪja: hɛ/	**IPA Transcription**
"یہ غلط ہے کہ میں نے جان بوجھ کر جھوٹا بیان دیا ہے۔"	**گواہ**
/je: ɣələt̪ hɛ kɛ mɛ: ne d͡ʒa:n bu:d͡ʒ kər d͡ʒʰu:ʈa: bəja:n dɪja: hɛ/	**IPA Transcription**

In this example, جان بوجھ کر is used as a neurolinguistic technique that forces the person to defend their intentions as well as their mind at the time of actions. so, the structure of the embedded question contains a presupposition that the witness gave a wrong statement, and clarifies that it was done intentionally or unintentionally. This technique not only reveals the witness's lie but also exposes the defense counsel's lie during cross-examination.

Technique # 5

Reframing Technique:

This technique is used to see a situation from a different perspective. This focused on another meaning or a hidden view. The same event can be viewed from a positive or negative perspective, depending on your perspective (NLP Mentor, n.d.). It makes people stretchy in their thinking and enables them to see the event from different viewpoints (Vaknin, 2008).

a) Negative Reframing:

This negative reframing is the most powerful tool of communication, as individuals mostly respond more powerfully to negative things as compared to positive things (Epperson, 2025).

Example:

کیا آپ نے جھوٹا میڈیکو لیگل سرٹیفکیٹ جاری کیا اور جھوٹی گواہی دی؟	**دفاعی وکیل**
/kɪa: a:p ne d͡ʒʊʈa: me:dɪko: li:gəl sərʈɪfɪke:ʈ d͡ʒa:ri: ki:a: ɔ:r d͡ʒʊʈi: gəʋa:hi: di:?/	**IPA Transcription**
"یہ درست نہیں ہے کہ میں نے جھوٹا میڈیکو لیگل سرٹیفکیٹ جاری کیا اور جھوٹی گواہی دی ہے۔"	**گواہ**
/je: dərʊst nəhi: hɛ: ke: mɛ:ne d͡ʒʊʈa: me:dɪko: li:gəl sərʈɪfɪke:ʈ d͡ʒa:ri: ki:a: ɔ:r d͡ʒʊʈi: gəʋa:hi: di: hɛ:./	**IPA Transcription**

In this example negative reframing technique is used as جھوٹا, and جھوٹی through which a false statement is given so that the witness denies it by saying یہ درست نہیں ہے, and truth is revealed for effective decision making.

Technique # 6

Contradictory Testing or Direct Challenge:

The lawyers check the consistency in the answers by using the contradictory technique

Example:

کیا آپ کے دستخط اِن دو دستاویزات پر مختلف ہیں؟	**دفاعی وکیل**
/kja: a:p ke: ɖəsʈxəʈ̪ ɪn do: ɖəsʈa:ʋe:za:ʈ̪ pər *mʊx ʈ̪ælɪf hɛ:n/*	**IPA Transcription**
یہ کہنا غلط ہے کہ میرے دستخط ان دو دستاویزات پر مختلف ہیں	**گواہ**
/je: kɛ:ɦna: ɣələt̪ hɛ:* kɛ: me:re: ɖəsʈxəʈ̪ ɪn do: ɖəsʈa:ʋe:za:ʈ̪ pər mʊxˈʈ̪ælɪf ɦɛ:n/	**IPA Transcription**

In the example, the phrase مختلف ہیں is used to check the consistency of the answers in the witness statement, and the witness denied it. Due to this technique, the witness shows the response as یہ کہنا غلط ہے

Technique # 7

Character Attack or Labeling Technique:

The interviewer characterized the person with a negative label to interrupt the trustworthiness of the person (Vrij, 2008).

Example:

کیا آپ کا مجرمانہ ذہن ہے اور آپ مخالفین کو پھسانے کے لیے جھوٹی کہانیاں گھڑتے ہیں؟	**دفاعی وکیل**

/kja: a:p ka: *mʊd͡ʒrıma:na: zɛɦn* ɦɛ: ɔ:r a:p mʊxa:lıfi:n ko: pʰəsa:ne ke: li:e d͡ʒʱu:ţi: ka:ɦa:ni:ja̰: gʱəɾte: ɦɛ:n/	**IPA Transcription**
یہ کہنا غلط ہے کہ میرا مجرمانہ ذہن ہے اور میں چھوٹی مجرمانہ کہانیاں گھڑنے کا عادی ہوں۔	**گواہ**
/je: kɛ:ɦna: ɣəlaţ ɦɛ: kɛ: me:ra: mʊd͡ʒrıma:na: zɛɦn ɦɛ: ɔ:r mɛ:n d͡ʒʱu:ţi: mʊd͡ʒrıma:na: ka:ɦa:ni:ja̰: gʱəɾne: ka: a:di: ɦũ:/	**IPA Transcription**

The phrase *مجرمانہ ذہن* is used to suggest that the witness is lying and has a criminal mindset by providing a fabricated account to the court. This technique makes the person aggressive, and by changing the behavior of the person, the reality is exposed.

Technique # 8

Anchoring

This NLP technique is a compelling method associated with feelings or a state characterized by a particular sign (Oberholzer, 2013). It can be in the form of words or patterns of language that trigger someone's particular reaction.

Example

کیا یہ سچ نہیں کہ طاہرہ نے طارق سے اپنی مرضی سے شادی کی؟	**دفاعی وکیل**
/kja: je: sətʃ nəhi:ŋ ke ta:hırə ne: ta:rəq se: ʌpni: mərzi: se: ʃa:di: ki:/	**IPA Transcription**
یہ غلط ہے کہ طاہرہ نے طارق سے اپنی مرضی سے شادی کی۔	**گواہ**
/je: ɣələt he: ke ta:hırə ne: ta:rəq se: ʌpni: mərzi: se: ʃa:di: ki:/	**IPA Transcription**

Technique# 9

Alternative Narrative / Shifting Blame

The person uses this technique to replace the original story by introducing a new clarification.

Example:

کیا پولیس نے جھوٹا مقدمہ بنانے کے لیے آپ کا انگوٹھا خالی کاغذ پر نہیں لگوایا تھا؟	**دفاعی وکیل**
/kja: po:li:s ne: *d͡ʒʱu:ʃa: moqəd̠ma: bəna:ne* ke li:je a:p ka: ʌŋgu:ţʰa: xa:li: ka:gəz pər nəhi:ŋ ləgʊa:ja: tʰa:/	**IPA Transcription**
رضاکار کے پولیس نے میرا انگوٹھا خالی کاغذ پر لگوایا تھا۔	**گواہ**
/rıza:ka:r ke po:li:s ne: me:ra: *ʌŋgu:ţʰa: xa:li: ka:gəz pər* ləgʊa:ja: tʰa:/	**IPA Transcription**

Use of Neurolinguistic Techniques in Investigative Journalism:

This analysis is done because the verbal data from Pakistani Courts are not easily available, and the researchers are using secondary data from social media platforms in which criminal interviews are recorded, and the investigative journalists are using neurolinguistic techniques for lie detection and expose the truth. This analysis helps that the same neurolinguistic techniques used in the Pakistani Court assist in the final findings of the research, as well as diverse strategies assist in lie detection in future cases.

In the previous research related to NLP, it was mentioned that two types of questions are asked of suspects to know what took place in the suspects' minds in cases of truth and lying (Oltmanns and Emery, 2010). For the suspects' understanding, the journalist asked questions by applying diverse neurolinguistic techniques.

Technique # 1

Minoring and Rapport Building:

Mirroring and rapport-building are techniques of neurolinguistics. It was mentioned that general activities and interests are asked in the rapport technique interview, which lasts about five minutes. It helps in noticing the speech patterns and body language during the entire interview (Bull, Valentine, & Williamson, 2009). This technique is used in lie detection tests. This data was unavailable to the researchers due to ethical issues. These techniques are also found in crime-related media programs used by investigative journalists.

Example:

تمہاری کتنی عمر ہے؟	Suspect (Female)
/t̪ʊ.ma:.ɾi: kɪt̪.ni: ʊ.mɾ hɛ/	IPA Transcription
35-40 سال عمر ہے۔	Suspect (Female)
/t̪i:n.t̪i:s ča:lıs sa:l ʊ.mɾ hɛ/	IPA Transcription
اچھا۔ مجھے یہ بتاؤ کہ تم نے معاونت کیوں کی۔	Anchor

	(Female)
/ət͡ʃ:a: | mʊ.d͡ʒʰe je: bəʈa:o: kɛ ʈʊm ne: mo:.a:.ənəʈ kju͂: ki:/	IPA Transcription
اے نا لڑ پئے سان۔ بچیاں نوں ماردا کٹدا سی۔ بچیاں نوں تھمکی دیندا سی۔بچیاں نوں جوں کردا سی۔کدی اندا سی میں چُھوری مار دینی اے۔ جو وی کردے سی	Suspect (Female)
/ɛ: na: ləɽ pəjɛ: sa:n | bət͡ʃijã͂: nu: ma:ɾ.da: kʊɽ.da: si: | bət͡ʃijã͂: nu: ʈʰəmki: ɖe:n.da: si: | bət͡ʃijã͂: nu: d͡ʒõ: kər.da: si: | kəɖi: ã:.da: si: mɛ̃ t͡ʃʰo:ɾi: ma:ɾ ɖe:ni: ɛ: | d͡ʒo: ʊi: kər.ɖe si:/	IPA Transcription

In another example, the journalist asked neutral questions by having a soft and friendly conversation with the suspect and then moved towards relevant crime-related questions, such as اچھا۔ مجھے یہ بتاؤ کہ تم نے معاونت کیوں کی۔ and the suspect revealed the truth by telling the background of the event, such as اے نا لڑ پئے سان۔ بچیاں نوں ماردا کٹدا سی۔ بچیاں نوں تھمکی دیندا سی۔بچیاں نوں جوں کردا سی۔کدی اندا سی میں چُھوری مار دینی اے۔ جو وی کردے سی

Technique # 2

Reality Reframing:

Reality Reframing is another technique in neurolinguistics. It means altering the perception or sense of an event without altering the event. This helps individuals in changing their perspective; in this way, the same situation is seen from a different angle and gives a new reaction (Bandler & Grinder, 1982).

Example:

ایف آئی آر میں تو *کچھ اور ہی* لکھا ہوا ہے	Anchor (Female)
[e:f ɑ:i: ɑ:r mẽ: to: *kʊt͡ʃ a:r hi:* lɪkʰɑ: hu:wa: hɛ]	IPA Transcription
تو وہ جو لکھا ہے مجھے *کچھ علم نہیں*۔	Suspect (Female)
[to: ʊo: ʤo: lɪkʰɑ: hɛ mʊʤʰe: *kʊt͡ʃ ɪlm nɛ:hĩ:]*	IPA Transcription

Technique # 3

Character Attack:

This NLP technique uses words by giving anybody an immoral label to observe them as less dependable (Bandler & Grinder, 1982; Vrij, 2008).

Example:

ایف آئی آر میں تو لکھا ہوا ہے کہ اپنے چچا سسر کے ساتھ تمہارے *تعلقات* تھے جس کی بنیاد پر تم نے اپنا شوہر قتل کروایا ہے	Anchor (Female)
/ɛf a: i: ɑ:ɾ me͂: to: lɪkʰa: hu:wa: hɛ ke: ʔəpnɛ t͡ʃə͡ʃa: sʊsʊr ke: sa:ʈ ʈʊmha:ɾe: *ʈəluqa:ʈ* ʈʰe: d͡ʒɪs kɪ bʊnja:ɖ pər ʈʊm ne: əpna: ʃo:hər qəʈəl kərwa:ja: hɛ/	IPA Transcription
یہ سب جھوٹ ہے۔ میں نے خود اپنے شوق سے کروایا ہے…*یہ سب جھوٹ ہے*	Suspect (Female)
/jeː səb d͡ʒʰuːʈ hɛ/. /mɛ̃: ne: xʊd ʔəpnɛ ʃo:q se: kərwa:ja: hɛ/. */jeː səb d͡ʒʰuːʈ hɛ/*	IPA Transcription

Technique # 4

Meta-Model Questioning:

Meta-model (or meta-model therapy) is a process to collect information about behavioral patterns of the human mind. It contains a set of questions that help in understanding how someone sees the world. It includes deletion, generalization, and distortion (Bandler & Grinder, 1975). The NLP Meta model helps us to get those absent pieces of data and to go into the deep structure of the communication. It can be divided into three main types: deletion (missing either forgetting or leaving out information, whether on purpose or by accident), generalization (making broad statements based on only a few examples or observations), and distortion (Saying things influenced by personal views, illusions, or beliefs).

Example 1:

تو *سچ* کیا ہے؟	Anchor (Female)
/tu: sət͡ʃ kja: hɛ/	IPA Transcription
سچ یہی ہے کہ اس کو اس کے چاچو نے مار دیا*… مجھے نہیں معلوم* کیوں مارا تھا	Suspect (Female)
/sət͡ʃ jɛhi: hɛ ke: ʊs ko: ʊs ke: ʈ͡ʃa:ʈ͡ʃo: ne: ma:ɾ dɪja:/. */mʊd͡ʒʰe: nɛhi: ma:lu:m* kju͂: ma:ɾa: ʈʰa:/	IPA Transcription

In this example, the suspect deleted the information, and the phrase مجھے نہیں معلوم is shown as an indicator of a lie.

Technique # 5

Emotional Provocation

It is an approach used in communication in which an utterer intentionally activates solid feelings as fear, anger, or guilt, in another person to affect the answers (Walton, 1992).

Example:

تمہیں *کبھی احساس نہیں* ہوا کہ تمہارے *گھر والے* تمہارے شوہر کو *مارنا* چاہتے ہیں؟	Anchor (Female)
/ʈomhẽ: kəbʰi: ɛhsa:s nɛhi: hu:a: ke: ʈomha:ɾe: gʰəɾ wa:le: ʈomha:ɾe: ʃo:həɾ ko: ma:ɾna: t͡ʃa:hte: hẽ:/	IPA Transcription
مجھے کبھی نہیں ایسے الحام *اپنے چاچو* سے اس کی لڑائی ہوئی تھی *اور مجھے نہیں پتا*	Suspect (Female)
/*mʊd͡ʒʰe: kəbı nɛhĩ:* æse: ılha:m/. */əpnɛ t͡ʃa:t͡ʃo:* se: ʊs kı ləɽa:i: hu:i: ʈʰi:/. /ə:ɾ *mʊd͡ʒʰe: nɛhi: pəʈa:/*	IPA Transcription

Through this approach, the anchor arouses the feelings in the suspect to check the response, and the suspect gives a few details, but then shows a denial of the information as *مجھے نہیں پتا*, which shows as an indicator of a lie.

Technique # 6

Presupposition:

It is a hypothesis that is made with the help of language because the neurolinguistic technique is goal goal-oriented approach. The founders of NLP that are Bandler and Grinder, gave several presuppositions that aid individuals to be more flexible in ordinary life and use methods to copy success (Walter, 2022).

Example:

اور جو *تعلقات* والی بات کہہ رہے ہیں وہ بھی کہہ دو جھوٹ ہے اب۔	Anchor (Female)
/ə:ɾ d͡ʒo: *ʈəluqa:ʈ wa:li:* ba:ʈ kɛh ɾəhẽ: hẽ: vo: bʰi: kɛh do: d͡ʒʰu:ʈ hɛ əb/	IPA Transcription
پتہ نہیں وہ لوگوں نے بنائی ہونی ہے۔	Suspect (Female)
/pəʈa: nɛhĩ: ʊo: lo:go: ne: bənɑ:i: ho:ni: hɛ/	IPA Transcription

The anchor is assuming that the relation exists with the uncle, so she put it on record. The anchor presupposes that the suspect already denied earlier to several things by using ,اب ہے جھوٹ دو کہہ بھی وہ but the suspect does not deny it directly by saying نہیں پتہ and shifts the burden to the people by saying ,لوگوں who made the story. so, this is a clear indication of a lie.

Technique # 7

Sensory-Specific Question

It is a type of question in which experience is asked by using the five senses, such as see, touch, taste, smell, etc. These questions assist in providing vague answers to the clear ones by considering what the person actually saw and experienced (Bandler & Grinder, 1975)

Example:

تم نے خود اپنے ہاتھ سے دیا؟	Anchor (Female)
/ʈʊm ne: xʊd əpnɛ ha:ʈ se: dıja:/	IPA Transcription
ہاتھ سے **دیا** انہوں نے کھانا نہیں کھایا۔	Suspect (Female)
/ha:ʈ se: dıja: ʊnho: ne: kʰa:na: nɛhĩ: kʰa:ja:/	IPA Transcription

In this example, *خود اپنے ہاتھ سے دیا* is used as sensory sensory-specific question, and the suspect responded and shared the experience.

Technique # 8

Leading Question:

This technique is similar to the court's technique. The example is mentioned below

Example:

تم شک کی بنیاد پر آئی ہو؟	Anchor (Female)
/ ʈʊm ʃək ki: bʊnja:d̪ pəɾ a:i: ho: /	IPA Transcription
جی۔	Suspect (Female)

/d͡ʒiː/	IPA Transcription

Through this neurolinguistic technique, verbal lie detection is highlighted, and the person then speaks the truth and shows the reality of the case.

Without the Neurolinguistic Technique

While the data that is without neurolinguistic techniques is mentioned with the examples below:

Example # 1

PW-9

بتایا۔ گواہوں کے بیانات قلمبند کیے۔ Exh.PH کو میں جائے وقوعہ پر پہنچی۔ معائنہ کیا اور گواہوں کی نشاندہی پر سائٹ پلان 27.03.2023 متاثرہ کے زخموں کا بیان تیار کر کے اسپتال بھیجا۔
کے Exh.PG اور دو بوتلیں دیں۔ میں نے یہ قبضے میں لے کر ریکوری میمو MLCطبی معائنہ کے بعد علیشبا ناصر نے مجھے کپڑے، تحت محفوظ کیا۔ کیس پراپرٹی محرر کو بحفاظت تھانے میں جمع کرائی۔
اور 29 مارچ کو چھاپے مارے مگر ملزمان نہ ملے۔ 28 کو لاہور جمع کرائی۔ PFSA کو کیس پراپرٹی 30.03.2023
کو ملزمان محمد یعقوب اور محمد قاسم گرفتار ہوئے، تفتیش اور جسمانی ریمانڈ حاصل کیا۔ 07.04.2023

Example # 2

PW-5

تھانہ صدر Exh.PD بیان دیا کہ وہ سرگودھا شہر میں رہتے ہیں۔ کوثر پروین نے اطلاع دی اور ہم شیخ طاہر امین کے گھر گئے۔ درخواست سرگودھا سے تیار کروائی گئی۔ بیان دیا کہ انہوں نے ملزمان کو ہمائرہ فاطمہ کو مارتے یا زیادتی کرتے اپنی آنکھوں سے نہیں دیکھا۔

Example # 3

PW-2

بیان دیا کہ وہ شاکی کا ماموں ہے۔ اس نے صفدر عباس اور علی حسن کے قتل کا وقوعہ اپنی آنکھوں سے نہیں دیکھا۔ صرف اطلاع پر جائے وقوعہ پہنچا۔

Example # 4

PW-3

بیان دیا کہ وہ شاکی کا چچا ہے۔ اس نے بھی قتل کا وقوعہ اپنی آنکھوں سے نہیں دیکھا۔ صرف اطلاع پر جائے وقوعہ پہنچا۔

This information is more detailed, and the person needs to extract data that is relevant to the case; it is difficult to extract the truth and lies from it.

Descriptive Statistics of Truth and Lie Statements by Sentence Structure with NLP Techniques:

After accomplishing the first objective, the research moved towards the second objective to know the descriptive statistics of truth and lies with and without neurolinguistic techniques. The study mentioned that before discriminating between lies from the truth, individuals rely on the most accurate cues, like detail in a story, through which they can get accuracy from 59 to 79 percent but this statistical analysis through python prevents from this method and helps the researcher to know the structure of the truth and lie sentences that, when a speaker is speaking a lie, then what type of sentences they create due to pressure on the mind, as shown in the Figure 4.1 and 4.2

Figure 4.1. *Python result of truth sentences*

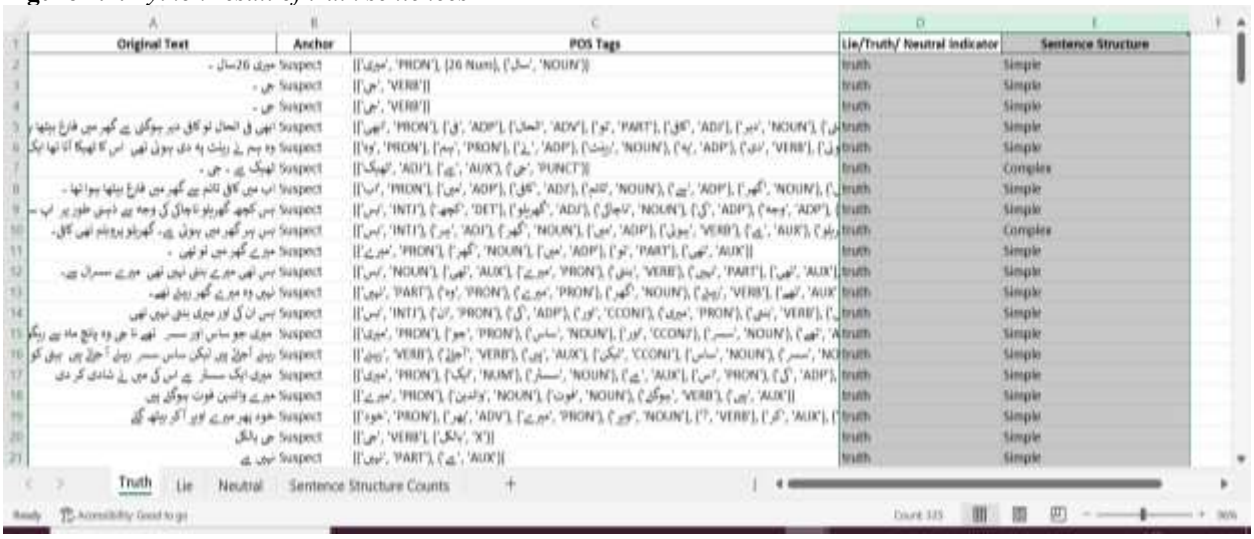


Figure 4.2. *Python result of lie sentences*

The research finds the grammatical structure of the truth, lie, and neutral sentences statistics with NLP and without NLP techniques. After using the Python code, the output file was shown in this form, and its statistics are shown in Figure 4.3

Figure 4.3. *Structure count of truth and lie sentences with the neurolinguistic technique.*

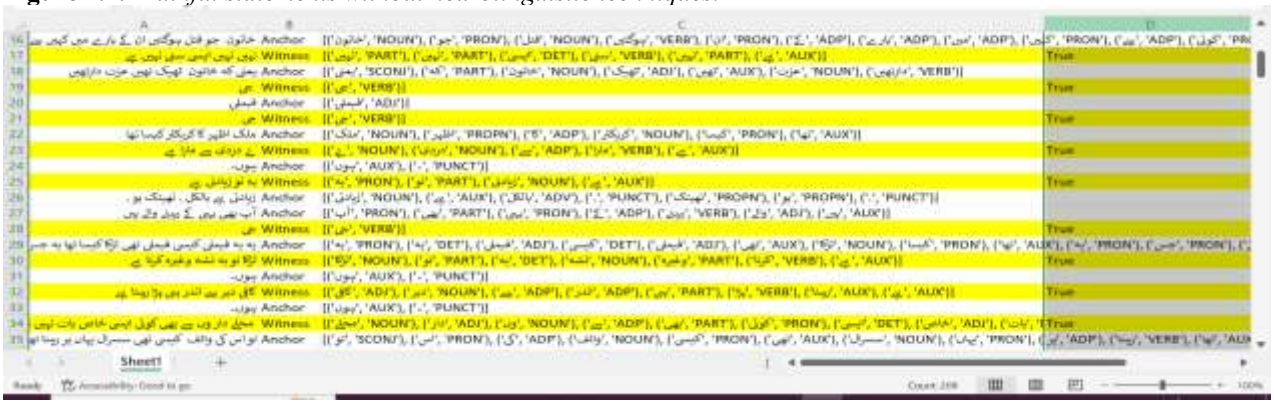
Sentence Structure	**Truth**	**Lie**
Simple	129	64
Complex	37	38

These results showed that the sentence structure of truthful sentences is simple, that is, 129 sentences of suspects in NLP techniques used by the anchor/ reporters or law enforcement agencies. Whereas simple sentence structures of lie are 64 out of 409. The remaining sentences are marked as neutral sentences by the machine. In complex sentence structural analysis, the lie sentences are more complex as compared to truthful sentences, and the statistics showed 38 sentences out of 409. There is a minor difference in the truth and lie complex structural sentences, and the statistics are 37 sentences.

Descriptive Statistics of Truth and Lie Statements by Sentence Structure Without NLP Techniques:

The researcher found that all data that is without NLP techniques contains truthful statements, as shown in the Figure 4.4

Figure 4.4. *Truthful statements without neurolinguistic techniques.*



The reason for the data without NLP is that this data contains declarative sentences in which witnesses give facts or information. Moreover, it does not give suggestions to others. Even the anchor or layer asked a question for clarification at some point. So, the code used for this type of analysis

Difference of Truth and Lie indicators with and without Neurolinguistic techniques:

The research analyzes the control and experimental group data to check the effectiveness of the neurolinguistic technique, and the results are:

Data Frame with NLP techniques:

a) Truth-Likely Keywords with Frequencies

The table describes that truth indicators include affirmation or confirmation words, such as جی، ہاں، ٹھیک، بلکل.

Sr. #	Keywords	POS Tags	Frequencies	NLP Technique	Indicator Type
1.	جی	INTJ	62	Leading Suggestion	Affirmation/confirmation
2.	ہاں	INTJ	45	Leading Suggestion	Affirmation/confirmation
3.	شادی	NOUN	5	Direct Questioning and Temporal Framing /	Factual/temporal/relational
4.	گیا	VERB	5	Temporal Framing / Direct Questioning	Action verb
5.	ٹھیک	ADJ	4	Acknowledgment / Minimal Encourager	Affirmation/confirmation
6.	گھر	NOUN	3	Direct Elicitation / Clarification	Factual/relational
7.	ساس	NOUN	3	Direct Elicitation / Clarification	Factual/relational
8.	کر	VERB	3	Role/Identity Elicitation	Action verb
9.	بیوی	NOUN	3	Fact-Based Prompt	Factual/relational
10.	تھی	AUX	3	Role/Identity Elicitation	Temporal / past reference
11.	حصہ	NOUN	3	Direct Elicitation / Clarification	Factual/relational
12.	شک	NOUN	3	Why-Question / Challenge	Factual / acknowledgment
13.	باجی	NOUN	3	Direct Elicitation / Clarification	Factual/relational
14.	کافی	ADV	2	Direct Elicitation	Quantifier / descriptive
15.	فارغ	ADJ	2	Direct Elicitation	Activity description
16.	ماہ	NOUN	2	Acknowledgment / Minimal Encourager	Temporal
17.	سسر	NOUN	2	Role/Identity Elicitation	Factual/relational
18.	غلط	ADJ	2	Why-Question / Challenge	Acknowledgment/correction
19.	عورت	NOUN	2	Direct Elicitation / Clarification	Factual / relational
20.	بالکل	ADV	2	Leading Suggestion	Affirmation / certainty

Secondly, fact-based, relational-based based or time-based keywords, such as شادی، گھر، ساس، بیوی، حصہ، باجی، ماہ، سسر، عورت show the truthfulness of the sentence. Thirdly, the characteristics of truth are, it contains action verbs, such as گیا، کر. Fourthly, it contains a past reference as تھی, quantifier as کافی, and activity as فارغ. The frequencies of each lexis are mentioned also mentioned in the table.

b) Lie-Likely Keywords with Frequencies

Sr. #	Keyword	POS Tags	Frequency	NLP Technique	Indicator Type
.1	نہیں	PART	73	Direct Elicitation	Denial/negation
.2	پتا	NOUN	23	Why-Question / Challenge	Hedging/uncertainty
.3	بات	NOUN	8	Why-Question / Challenge	Contradictory/evasive reference
.4	کیا	VERB	7	Role/Identity Elicitation	Contradictory/evasive reference
.5	گھر	NOUN	6	Direct Elicitation / Role-Identity Framing	Contradictory/evasive reference

.6	ہے	AUX	5	Why-Question / Challenge	Filler / vague
.7	سی	PART	5	Why-Question / Challenge	Hedging/uncertainty
.8	کوئی	DET	4	Why-Question / Challenge	Hedging/avoidance
.9	سے	ADP	4	Why-Question / Challenge	Hedging / vague relation
.10	تھا	AUX	4	Direct Elicitation	Past reference/evasion
.11	عزت	NOUN	3	Direct Elicitation	Justification/defensive
.12	میرے	PRON	3	Direct Elicitation	Ownership assertion / defensive
.13	دو	NUM	3	Fact-Based Prompt	Quantity / vague
.14	پیتا	VERB	3	Why-Question / Challenge	Hedging/uncertainty
.15	تکلیف	NOUN	3	Why-Question / Challenge	Excuse/justification
.16	دیا	VERB	3	Acknowledgment / Minimal Encourager	Possibly misrepresented action
.17	کھایا	VERB	3	Direct Elicitation	Possibly misrepresented action
.18	بنتی	VERB	2	Direct Elicitation	Relational denial
.19	کار	NOUN	2	Fact-Based Prompt	Possession claim / vague
.20	وائف	NOUN	2	Fact-Based Prompt	Marital reference / possible evasion

Whereas a liar uses words in which the denial of relations and negation are present as نہیں، بنتی. Vague and uncertain words are used as کوئی، پتا، سی، پیتا. Moreover, contradictory words as بات، کیا، گھر are also representations of lie cues. A liar also gives justification or remains defensive as عزت، میرے، تکلیف. Furthermore, misrepresentation of actions as کھایا، دیا

The analysis of these indicators reveals that NLP techniques are most effective in detecting truth and lies, including direct elicitation, emotional triggers, accusation/challenge, and accusation/pressure on the brain. Whereas role, or framing of identity, Wh-questions, and direct elicitation of NLP techniques work well for lie detection.

Data Frame without NLP techniques:

c) Truth-Likely Keywords with Frequencies

Sr. #	Words	POS Tags	Frequencies
1.	نہیں	PART	49
2.	اس	PRON	25
3.	تھا	AUX	24
4.	میں	ADP	22
5.	پوچتے	VERB	1
6.	ہوتا	VERB	1
7.	پوچھا	VERB	1
8.	ہونڈا	NOUN	1
9.	یہی	VERB	1

These words are shown as a true indicator by the machine learning model, but these words are not certain that these words always represent truthful sentences. As the word نہیں is common in both NLP and without NLP data as a true indicator, but it is not shown as a result or impact of the NLP technique. Similarly, the other words are very common words that are used in daily routine, such as اس, تھا, میں, پوچتے, ہوتا, پوچھا, ہونڈا, یہی.

Sr. #	Words	POS Tags	Frequencies
1.	جھگڑا	ADJ	1

Whereas only one word is shown as an indicator of a lie from 10,360 words. Moreover, this word is not a true

indication of lying in every situation. This is the reason that the previous studies mentioned that there is no particular indicator of truth and lies in linguistics.

CONCLUSION

In Pakistani courts, the researcher found that the NLP techniques that are mostly used in Pakistani courts are: detail omission, challenge, repetition, leading questions, suggestive questioning/presupposition, reframing technique, negative reframing, contradictory testing or direct challenge, character attack or labeling technique, anchoring, alternative narrative / shifting blame.

Moreover, the researcher also found that in NLP data, the truth indicators are those in which affirmation or confirmation words, fact-based, relational-based based or time-based keywords, action verbs, past reference quantifier and activity are mentioned through words, and when the investigation officers or journalists use these NLP techniques, as direct elicitation, emotional trigger, accusation/challenge, and accusation/pressure on the brain assist the law enforcement agencies as well as journalists to find the reality. Whereas a liar uses words in which the denial of relations, negation, vague and uncertain words, contradictory words give justification or remain defensive, and misrepresentation of actions. Finally, truthful sentences are simple in structure, while liars create complex sentences during speaking due to pressure on their brains, as well as to remain defensive during lying.

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