

Voice Recognition in Forensic Evidence-A Situational Phenomenon as Stratagem In Crime Track and Scale Down

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ABSTRACT

The short definition of robbery is theft from a person by use of force or fear. The level of force does not have to be great to meet the statutory requirement. On the bases of tracking and scaling down robbery crime, the study mock up a situational phenomenon of robbery operation and envisage a stratagem in crime track and scale down. The study employed voice recognition as a first line of identifying suspect(s) by method of ear witness account. In the phase 1, of the study, close associates and unfamiliar versus total strangers were employed to recognize each other by voice without seeing the persons and followed by matching of blood group, In the phase 2 of the electronic method, phone calls were made to close associates and unfamiliar versus total strangers, with strange phone lines. The results show that close associate tends to recognize each other's voice more frequently than unfamiliar persons. From the results the percentage reliabilities in voice recognition and blood typing were most reliable among the close associates and least in the unfamiliar versus total strangers. Blood group analysis in conjunction with voice recognized may offer profound reliability on crime solving.

Key words: Associates, Blood, Crime, Informants, Reliability, Academy.

INTRODUCTION

Voice recognition, on forensic evidence, is the ability of persons to remembering and understanding the spoken word for the purpose of forensic evidence. The ability to recognize people by their voice is an important social behavior. Individual differs in how they pronounce words, and listeners may take advantage of language specific knowledge of speaker phonology to facilitate recognizing the voice. Human listeners are more accurate in identifying voices when they can understand the language being spoken (Perrachione and Wong, 2007). The tone of voice may be modulated to suggest emotions such as anger, surprise, or happiness (Smith et al., 1975; Williams and Steven, 1972). The sound of each individual's voice is entirely unique. The term voice recognition (British English, 2012) or speaker identification (Reynold and Rose, 1995), refers to identifying the speaker rather than what they are saying. Recognizing the speaker can be used to authenticate or verify the identity of a speaker as part of the security

process. Crime is the violation of norms or values thought to threaten a society. It is more of a sociological concept which encapsulates the spectrum of negative events in the society (Umar, 2015).

Crime rate in Nigeria has risen over the years (Uche, 2008; Financial, 2011 as represented in Figure 1) and cases of armed robbery attacks among others have increased due to some features of inequality, unemployment, poverty, injustice, and inhumanity (Dikko et al., 2013). Nwokedi (2011), reported that, armed robbery has not been adequately addressed by successive governments. Although the exact number of crimes that occur in Nigeria is unknown, criminal activity can be gauged by the incidents reported to law enforcement (Figure 1). The unemployment rate in Nigeria is high (Arinze, 2010) and social services are not available to those without jobs and millions of people watch as corrupt leaders, loot the country's treasury. The afore-mentioned reasons for the increase in the crime

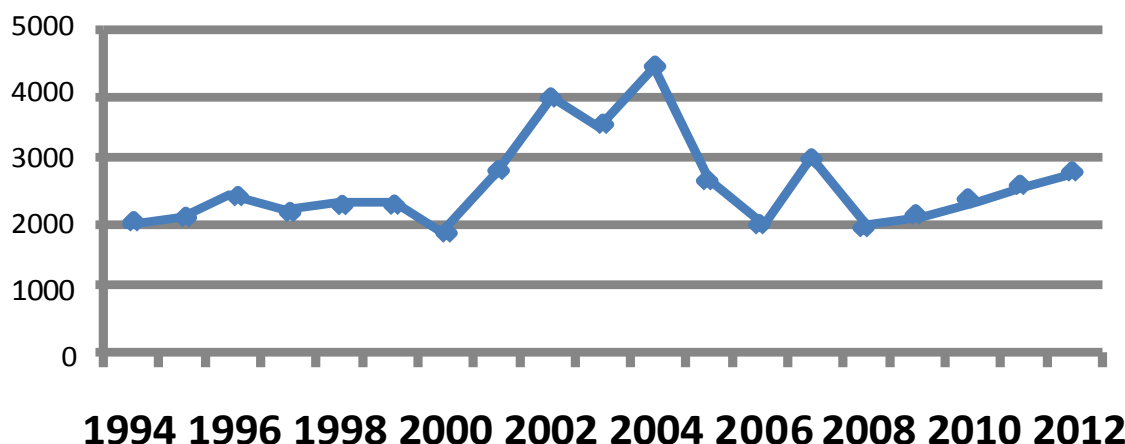


Figure 1. Summary of armed robbery crime statistics in Nigeria from 1994-2012. SOURCES: The Nigeria Police abstract of crime statistics as cited by Ugwuoke (2010:190-191) and CLEEN FOUNDATION, 2010 (Center for Law Enforcement and Education in Nigeria).

rate in Nigeria are not meant to justify the actions of those who perpetuate armed robbery among others. Most armed robbery attacks are based on information from someone who knows them to someone who is into the criminal acts. Also, the armed robbers may be familiar with the vicinity of their targets, in this case may wear masks on the face (Yusha'u, 2015). Armed robbery in criminal law, felonious act consists of the unlawful taking by means of violence or intimidation, of property in the possession or in the immediate presence or control of another (Umar, 2015).

In modern English and Nigerian law, crime of robbery is generally defined by statute. Robbery at one time was punishable by death, in Nigeria (Amnesty Intl., 2013; Reuters, 2013; Adebayo, 2015 cited in 48 Section 1 (3) of the Robbery and Fire Arms Act). Roger and Carolyn (2008) report that the death penalty applies for use of firearms or explosives in undermining public order even when no death results. The punishment was far from theoretical during military era. By statute both in Nigeria and in the most countries, degrees of robbery have been established with varying penalties, the most severe of which is life imprisonment for first-degree robbery committed by an offender armed with a dangerous weapon. Robbery is largely an urban crime and generally increases with the size of the city. Most robbers devote little time to planning their offenses and give scant thought to the possibility of being caught. A high proportion carryout their robberies within their own neighborhood or city. Armed robbery is amongst the most serious and potentially dangerous crimes that occur in Nigeria today.

This line of research is not a dead end, the facts and logics are well articulated as well as being precise and painstaking, to describe voice recognition evidence,

hence is kept in the open. Though while speaking during robbery operation by armed robbers, effort are made by the arm bandits in minimizing movement of the tongue and lips, and maintaining an impassive facial expression so as to focus the victims' attention on the illusory source of the sound. This may be the impedance especially in such tensed period and actions are cursorily done in addition to the uproarious scenario. At present voluntary voice recognition training exercise is ongoing -another new feature on the research landscape.

STATEMENT OF PROBLEM

The evidence available on the crime scene, through blood typing is not as convincing as genetic fingerprinting but it can readily prove innocence or increase the probability of a defendant being guilty of the crime. In Nigeria genetic fingerprinting technology is not readily available. In conjunction with voice recognition and blood typing, a convincing relationship of the offender can be established with the crime. This is the fundamental principle on the statement of the problem as portrayed in the research.

JUSTIFICATION OF THE RESEARCH

Many individual(s) in the past were notorious for armed robbery exemplified in 1980s by Anini and the gang (Marenin, 1987). There is rapid upsurge on the needs to tackle crimes in all ramifications. In view of this, our research rationale is based on the highly cerebral power of deductive reasoning per situation prevalent at the moment in conjunctions with the grass root need to rid

the country of unwanted elements and peeps into the remote causes of the crime. Crime requires information and the informant in most cases are associates (Adebayo, 2015). Informants referred pejoratively in this research supply information without the consent of the other parties with the intent of malicious, personal or financial gain (Levine, 2009). The fact that victims are at times on repeated attacks (Francis, 2015), likewise mandated the dear need to involve them through voice recognition on forensic evidence to curb and alleviate their trauma. Aside from helping to uncover information, phonetics can be helpful in interpreting meaning from the sound of speech (Pragnesh and Udhayabanu, 2012). Interestingly, this work relies on an imaginative solution to a long-standing problem and the applicative power of the work would be the justification.

SIGNIFICANCE OF THE RESEARCH

To create awareness on the idiosyncrasies of human voice recognition and the popularization of this fresh idea will have tomorrow's merit. The originality of this research in its virgin perspective serves the significance in the crime track and scale dawn. Additionally, it is a mental stimulus and hence food for thought to the Nigerian populace as crime prevention is everybody's business. Time will tell whether the research rationales have made the right impact, on this train of thought, this work stresses on the collective effort to rid the nation of all undesirable elements, yes peoples' oriented security control is the catch phrase.

METHODOLOGY

Sampling Method

Random sampling methods were adopted and employed. The people selected were nominated in randomized manner to produce good representative.

Research Design

The research was designed in two phases with eight groups of five members each: Phase 1: manual, this was designed to test the ability of students to recognize each other through voice from spoken words ('ear witnesses'). It is subdivided into (1) close associate in the same class and (2) unfamiliar versus total strangers. Each group was allocated twenty seconds for the ear witness voice recognition. Students of Nigeria Police Academy Wudil Kano State were employed. The students in each group were behind, each in opposite direction to a group of twenty speakers and keenly listen to their voices for identification. Each group in turns acts as the ear witness, and recorded the name of the speaker according to the

voice they heard. The voice was matched with the blood group for identification. The mock up blood group provided at the simulated crime scene was crossed matched with the voice heard and the result presented in percentage to depict reliability of the tool. The blood groupings were to provide consensus of findings.

Phase 2: Electronic: this was designed to test the ability of persons staying in different parts of the country to recognize each other through the telephone calls with unfamiliar numbers. Peoples at random staying in Abuja metropolis, the capital of Nigeria were employed as representatives of the country Nigeria, metropolis. Telephone calls were made at will and the result noted by individual speaker. Each person in a group spoke for thirty seconds. It was subdivided into (1) close associates and (2) unfamiliar versus total strangers. There was no inclusion of the blood grouping in the electronic testing. The ethical guidelines, in accordance with the international community on the use of humans for research purposes were followed. Each person in a group spoke for thirty seconds. It was subdivided into (1) close associates and (2) unfamiliar versus total strangers. There was no inclusion of the blood grouping in the electronic testing.

Statistical Analysis

Data were presented as mean \pm Standard Deviation of ten persons, and data were analyzed for statistical significance by ANOVA. It was further subjected to Fischer LSD post hoc test using the SPSS Genstat Release software package version 20. Differences between means were considered significant at $p < 0.05$.

RESULTS

Tables 1 and 2 show the percentage of correctly matched voice on the person(s) marked as armed robbers (culprits), in the manual testing of associates and unfamiliar. The result of Table 1 depicted that, among the 9 groups, Groups (A and B) and (D, E, and I) were significantly different at $p < 0.05$, to three and two other groups, respectively. But groups C, F, G and H were not significant to any group. Group D and I have the most percentage ability to recognize voice while group A has the least. The average lies on the non-significant group and is not below 80%. In the Table 2, each of the group was not significantly different to anyone. Group C has the highest ear witness, through voice recognition while group D and G have the lowest. The fact that, there was no significant difference in Table 2 would have made uniformity of findings among the tested group but low percentage average has nullified the merit of harmonious outcome. The pleasantness in result arrangement and distribution is a function of reliability and reliability, a question of non-significant difference among the groups

Table 1. Manual testing on voice recognition among close associates.

Groups	Numbers In A Group	Correctly Matched Voice (Percentage)
Group A	10	67.40±16.40 ^{dei}
Group B	10	70.00±21.2 ^{de}
Group C	10	80.20±5.93
Group D	10	86.20±4.15 ^{ab}
Group E	10	85.00±5.00 ^{ab}
Group F	10	80.00±7.01
Group G	10	80.00±0.00
Group H	10	80.00±7.07
Group I	10	86.60±4.15 ^{ab}

Values are expressed as mean ± standard deviation of n =10. Significant difference expressed as $p < 0.05$ Values bearing p^{ab} is significantly difference with groups A and B. Values bearing p^{dei} is significantly difference with groups D, E and I.

Table 2. Manual testing on voice recognition among unfamiliar voice versus total strangers.

Groups	Number In A Group	Correctly Matched Voice (Percentage)
Group A	10	8.00±8.37
Group B	10	2.00±4.47
Group C	10	12.00±13.04
Group D	10	0.00±0.00
Group E	10	4.00±5.48
Group F	10	6.00±8.94
Group G	10	0.00±0.00
Group H	10	10.00±7.07
Group I	10	6.00±8.94

Table 3. Blood group analyses on suspects in the manual testing on voice recognitions among associates.

Groups	Number In A Group	Correctly Matched Blood (Percentage)
Group A	10	82.40±16.40 ⁱ
Group B	10	80.00±21.21 ^{dei}
Group C	10	86.20±10.83
Group D	10	96.20±4.15 ^{bci}
Group E	10	95.00±5.00 ^b
Group F	10	90.00±7.07
Group G	10	92.00±8.37
Group H	10	94.00±10.00
Group I	10	96.80±1.15 ^{ab}

Values are expressed as mean ± standard deviation of n =10. Significant difference expressed as $p < 0.05$ Values bearing p^b is significantly difference with group B. Values bearing p^{ab} is significantly difference with groups B and B. Values bearing p^{bci} is significantly difference with groups B, C and I. Values bearing p^{dei} is significantly difference with groups D, E and I. Values bearing p^i is significantly difference with groups I.

indicating pleasant outcomes. For the result of corresponding blood grouping of the manual testing on the mock up crime scenario in simulated blood typing, presented in Tables 3 and 4.

The results of the Table 3 of the close associate in blood typing, depicts, Group Band D were significantly different to three other groups, Groups A was significantly different at $p < 0.05$ to one other group, Group I was significantly different to two other group at $p < 0.05$. There were no

significant differences in Group C, F, G and H, to any group. Group (D and I) and B have the highest and lowest percentage of correctly matched blood grouping, respectively. Again, the average lies on the non-significant groups. The result in Table 4, of the unfamiliar versus total stranger indicated no significant difference among the groups. The poor average in the percentage outcome again nullified the merit of non-significance in the tested group. The Group F and E have the highest

Table 4. Blood group analyses of suspects in the manual testing on voice recognitions of unfamiliar versus total strangers.

Groups	Number In A Group	Correctly Matched Voice (Percentage)
Group A	10	51.40±13.41
Group B	10	55.00±11.18
Group C	10	53.00±14.83
Group D	10	58.00±13.04
Group E	10	45.00±11.18
Group F	10	60.00±7.07
Group G	10	56.00±19.49
Group H	10	48.00±13.04
Group I	10	50.00±10.00

Table 5. Electronic testing on voice recognition among close associates.

Groups	Number in a group	Correctly matched voice (Percentage)
Group A	10	47.00±13.51
Group B	10	50.00±7.91
Group C	10	48.00±12.55
Group D	10	53.00±13.04
Group E	10	40.00±11.18
Group F	10	55.00±7.07
Group G	10	51.00±17.82
Group H	10	43.00±13.04
Group I	10	45.00±10.00

and lowest percentage of correctly matched blood typing. The results of electronic testing of close associate and unfamiliar versus total strangers are presented in Table 5 and 6, respectively. The Table 5 showing electronic voice recognition among closed associates indicates no significance different among the groups. The average of the percentage outcome is not less than 48%, hence it considered a good outcome with 48% reliability. Group F and H have the highest and lowest percentage of the correctly matched voice, respectively. In the unfamiliar versus total strangers, represented in Table 6, all the groups showed significant difference among each other. Group A and F were significantly difference at $p < 0.05$ to five groups. Group E was to four groups, Groups D, H and I to three at $p < 0.05$. Group B was significantly different at $p < 0.05$ to two groups. The Groups C and G were significantly different at $p < 0.05$ to one of the groups. The Group F and E were the highest and lowest in correctly matched voice respectively. Group A and F have the highest significant difference.

DISCUSSION

We tested voice recognition ability of peoples among two categories of persons viz close associates versus familiar and unfamiliar versus total strangers to personify (represent) armed robbery scenario and inferentially

crime. Although armed robbery operations are highly coordinated in hasty manners. Some as gangs group may show well-coordinated yet skillful team work. The times allocated were small to mimic the situational arena of crime so as to mock up armed robbery operation. The speaker recognition process relies on features influenced by both the physical structure of an individual's vocal tract and the individual's behavioral characteristics. These were employed in the result. In the manual testing of both the associates and unfamiliar versus total stranger, simulate blood typing were used to project the scientific backings. This was not used in electronic testing, since the people had no knowledge of each other locations.

The results showed that eyewitness account in all the groups in the close associates (Table 1), were not below 80% in the average. This indicates close associates may through eyewitness make a genuine suspect on possibility of persons being the perpetrator of a crime at a particular point. The result average lies along four of the groups which are the non-significant groups hence provided fair distribution and agreement of results. This projects agreement between tested groups. The result of the simulate blood typing in the mock up scene showed testing amount to a good testing method and is supportive of the ear witness account in the voice recognition testing in the manual testing of the above (Table, 3). It showed a high percent of correctly match blood groups with right voice in the eyewitness account.

Table 6. Electronic testing on voice recognition among unfamiliar versus total stranger.

Group	Number In A Group	Correctly Matched Voice (Percentage)
Group A	10	10.00±3.54 ^{bcehi}
Group B	10	3.00±4.47 ^{af}
Group C	10	4.00±4.18 ^f
Group D	10	7.00±8.37 ^{ehi}
Group E	10	0.00±0.00 ^{adfg}
Group F	10	11.00±4.18 ^{bcehi}
Group G	10	6.00±4.18 ^e
Group H	10	1.00±2.24 ^{adf}
Group I	10	1.00±2.24 ^{adf}

Values are expressed as mean \pm standard deviation of $n = 10$. Significant difference expressed as $p < 0.05$. Values bearing p^{adfg} is significantly difference with groups A, D, F and G. Values bearing p^{af} is significantly difference with groups A and F. Values bearing p^e is significantly difference with groups E. Values bearing p is significantly difference with groups F. Values bearing p^{bcehi} is significantly difference with groups B, C, E, D, H and I. Values bearing p^{ehi} is significantly difference with groups E, H and I. Values bearing p^e is significantly difference with groups E. Values bearing p^{adf} is significantly difference with groups A, D and F.

The result of the blood typing was at an average not less than 90%. It shows highly reliability of 90%. The high percentage agrees with that of the voice result, providing a concordant agreement, but on why the average of the blood typing is higher than the voice result may be due the higher possibility of guessing a blood group correctly, which is 25% (1/4). This is because everybody must belong to either of blood group A or B, or AB or O. this mean that blood grouping has some uncertainty when used in isolation and moreover more than one person may have the same blood group whereas voice is unique. Blood group is inherited and does not change but the same cannot be inferred of voice. Though, voice after puberty is difficult to change may become relative constant. Voice is affected by environment. During crime operations, voice may change due to unforeseen circumstances, like being announced during the operation. This is why it is well advocated not to irritate armed robbers so as to give them the ample opportunity to be natural while they are talking hence the absolute need to cooperate with the armed robbers. Because armed robbers are adults, the voice recognition in conjunction with the blood typing is a welcomed advancement in crime track and scale down, through participatory role of the victims.

The result of manual testing on unfamiliar versus total strangers in Table 2, shows poor reliability outcome. The average percentage outcome in is not more than 10%, indicating a 10% reliability hence poor reliability. This can be improved through extensive training on voice recognition. The result of the correctly matched voice in close associates as compared with the unfamiliar versus total stranger depicts wide margins. This shows that familiar people tend to, with time recognize each other's voice, although armed robbers operate through informants, few may be total strangers. Sometimes the informants are involved directly but with mass on their

faces (Yusha'u, 2015). Hence voice training an important issue in crime track and scale down. In the correctly matched blood group in Table 4, of the unfamiliar versus total strangers, the results portrayed an average of more than 48% reliability. This is not necessarily a bad outcome. The non-significance among the group may show uniformity of the groups. The discrepancy between the averages in this percentage may be due to similar aforementioned conditions. In the electronic testing, depicted in Tables 5 and 6, the people in each were tested for voice recognition through the use of phone calls (electronic medium), that has the ability to record audio messages. In the close associate testing (Table 5), the non-significance among groups depicts again uniformity in the tested groups. The average percentage was 48% hence the reliability is 48%. This again is not necessarily bad. Training may improve the individual ability to recognize voice percentage. In the unfamiliar versus total stranger represented in Table 6, shows a poor outcome, all the groups were significant, showing non uniformity and hence unreliable. The average percentage in this category was less than five percentage, hence a weak reliability of 5%. Despite this weak outcome, enhance training on voice will beef the results.

Conclusion

The physiological component of voice recognition is related to the physical shape of an individual's vocal tract, which consists of an airway and the soft tissue cavities from which vocal sounds originate. The understanding of this is vital in voice training. The results generated in this research showcased the relevance of the voice recognition with its attendant blood grouping. The percentages of correctly matched voice in the different

categories have depicted the reliability of this tool. The highest reliability is among the close associates category and lowest in the unfamiliar versus total stranger. From the research, voice recognition will serve as a useful tool in creating the first line of investigating crime suspect. This in combination with blood stain among others, during crime, will bring closer convincing evidence. Though armed robbers will in the best possible way avoid being injured and sometimes the stain may get dried. But the idea of voice recognition is to provide reasonable clue and not necessary as a final prove of persons' identity, involved in the crime. Sometimes voice is the only clue for police and Forensic Scientists to identify criminal (Pragnesh and Udhayabanu, 2012).

This method of crime solving, verifies a suspect's identity during an interaction with a voice application, such as a mobile phone application and manual application in the operation period. Most robberies still rely on the clean cut information gathering, of which the informant may be close by person(s). These descriptions of robbery may not exceed anything else we have heard but a real time situational stratagem is advised through voice recognition ability. This may be the real success of the crime scale down. Available statistics show that over 70% confessions made by robbery suspects confirmed that most operation are aided by close associates of the victims, necessitating the idea of voice recognition a paramount brain work and through awareness with proper sensitization, may be invaluable tools in the hands, all and sundry. This is a help tips and needs intelligent application through intelligence gathering and cordial relationship with the citizenry by members of police force (Katso, 2015). This intelligence gathering places voice recognition in a high position, making voice recognition doctrine of necessity. Critics say voice hard during crime can be inaccurate, however, because a person's voice is affected by variables like mood, health and changes such as the wearing of dentures (false teeth) can affect the sound of a person's voice (Lisa, 2007). The researcher argued that voice recognized in addition to blood found at the crime scene will help for the logical establishment of the relationship between the victim and suspect in the court of law. This may in part help curb crime. Emotion, physical health, and changes such as the wearing of dentures can affect the sound of a person's voice.

Researchers strongly advocate for adequate cooperation with armed robbers by their victims during of robbery, for effective utilization of this method solving crime. Crime control and prevention is still bedeviled by numerous complex problems. When an opportunity for crime is blocked, an offender has several alternative types of displacement (Gabor, 1978). However, the introduction of modern scientific and technical methods in crime prevention and control has proved to be effective. The application of multivariate statistics has made some contributions to many criminological explanations

(Kpedekpo and Arya, 1981; Printcom, 2003). If other method alongside with this method is applied, depending on the prevailing circumstance, more convincing evidence may abound. This tool has the merit of identifying the suspect and this is the earliest step in controlling crime.

RECOMMENDATIONS

The voice recognition training center should be extended to other states of the federation. Interested individual(s), groups and the Federal Government are kindly requested to encourage the group through fund donations. The chairperson of the organization may be contacted by +2348028545802.

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