

## SUBJECTIVE VOICE IDENTIFICATION: THE LITERAL MEANING OF "TALKING YOURSELF BEHIND BARS"

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*The author discusses the area of subjective voice identification and the use of "voice line-ups" in criminal proceedings. Forensic research in this area is reviewed and relevant legal arguments and issues are outlined.*

### I. INTRODUCTION

The voice has long been accepted as a method of identification. In fact, the oldest reference to this is in the Bible, Genesis 27: v. 1-22. In addition, Quintilian, in the first century A.D., wrote: "the voice of a person is as easily distinguishable by the ear as the face is by the eye".<sup>1</sup> From a legal and scientific standpoint, the issue of speaker recognition has been considered more recently. There are essentially three general methods of speaker recognition, which can be considered as ranging, on a continuum, from subjectively to objectively based.<sup>2</sup> The first and oldest method is speaker recognition by listening. In this situation a person attempts to recognize a voice by its familiarity. For example, this method is used by people everyday when they answer the telephone. The second method is a more objective one involving speaker recognition by visual comparison of spectrograms and is popularly known as "voiceprinting".<sup>3</sup> The third and still developing method involves speaker recognition by machine or automated recognition. Although each of these methods presents unique and interesting legal and forensic problems, this paper will deal strictly with the first method since it is this which is involved in the procedure often referred to as a "voice line-up". In addition, this paper is divided into two major parts. The first part will discuss forensically relevant research in the areas of psychology, psycholinguistics and linguistics in order to give support to the legal arguments and issues raised in the second part.<sup>4</sup>

### II. RELEVANT EXPERIMENTAL RESEARCH

#### A. THE BASIC PREMISE

All of the above discussed methods of speaker recognition are based on the fundamental premise that every person's voice is unique or distinct. This proposition relies on what is often referred to as the "theory of invariant speech".<sup>5</sup> This theory, in essence, states that interspeaker

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1. Dwight Mayor, "Subjective Voice Identification" (1985) 47(3) *R.C.M.P. Gazette* 6 at 6.
2. M. Hecker, "Speaker Recognition: An Interpretive Survey of the Literature" (1971) 16 *A.S.H.A. Monographs*. See also Oscar Tosi, *Voice Identification: Theory and Legal Applications* (1979) at 1-2.
3. An acoustic or speech spectrogram consists of a visual display of the main parameters of a speech wave: time, frequencies, and power or intensity within each range of frequencies. See Tosi, *supra* n. 2 at 42.
4. The author has a Bachelor of Arts in Psychology and some knowledge in the areas of psychology and psycholinguistics.
5. D.M. Stotland and G.O. Brown, "Voiceprints" (1977-78) 4 *Dalhousie L. J.* 708 at 714.

variability is always greater than intraspeaker variability.<sup>6</sup> Interspeaker variability refers to the phenomena that pronunciation of a given word or phrase tends to vary from speaker to speaker. This variability is attributed in part to organic or biologically inherited differences in structures of the vocal mechanisms.<sup>7</sup> These differences are said to produce an individual and unique "voice quality". For example, characteristics of speech are uniquely determined by vocal cavities, such as the length of the vocal tract, and by articulators, such as the soft palate, teeth, jaw, and lips. In fact, the physical contours and dimensions of these structures vary between persons much like any other part of the anatomy. Differences in stress and tension, as well as those in structural size and shape, can also have an effect.<sup>8</sup> The second major source of interspeaker variability is learned differences in the use of the vocal mechanisms during speech production.<sup>9</sup> These differences are often related to regional social and cultural factors, and are evidenced in speech rhythms and melody.<sup>10</sup> In addition, speech habits such as pauses, hesitation sounds, phrasing, inflections, and peculiarities of pronunciation are extremely distinctive.<sup>11</sup> These speech mannerisms are often referred to as "vocal settings" and involve a complex learned muscle manipulation which is unlikely to be identical in any two people.<sup>12</sup> The combination of these two sources of interspeaker variability makes the likelihood of two people having identical voices seem remote.<sup>13</sup>

There are four sources of intraspeaker variability: the time lapse between pairs of utterances; anatomical, physiological and psychological circumstantial conditions of the speaker; the manner of utterance; and the disguising or mimicking attempts of the speaker.<sup>14</sup> In essence, intraspeaker variability is a term which describes the commonsensical fact that a particular speaker rarely utters a given word or phrase twice in exactly the same way, even when the utterances are produced in succession.<sup>15</sup> Details of each utterance will change depending upon the rate of speaking, mood of the speaker, the emphasis given to various words, and many other variables.<sup>16</sup> In addition, there are some aspects of sound that are nonessential to intelligible speech (for example, breathing habits) and speakers are free to produce them in various ways and do form habitual characteristics.<sup>17</sup>

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6. Tosi, *supra* n. 2 at 42; see also *Voice Identification Research* (National Institute of Law Enforcement [N.I.L.E.] and Criminal and Justice, 1972) at 5 and 39.

7. Tosi, *id.* at 42; N.I.L.E., *id.* at 5 and 39.

8. For details see S.A. Gelfand, *Hearing: An Introduction to Psychological and Physiological Acoustics* (1981); J.L. Flanagan, *Speech Analysis Synthesis and Perception* (1965).

9. Tosi, *supra* n. 2, and N.I.L.E. *supra* n. 6. See also *Scientific and Expert Evidence in Criminal Advocacy* (1975) J.G. Cederbaums and S. Arnold (eds) at 251.

10. N.I.L.E., *id.* at 5; see also *On the Theory and Practice of Voice Identification* (The National Research Council, 1979) at 15.

11. National Research Council, *id.* at 15.

12. Stotland, *supra* n. 5 at 714.

13. See H.C. Allison, *Personal Identification* (1973) at 63.

14. Tosi, *supra* n. 2 at 45.

15. National Research Council, *supra* n. 10 at 17. See also L. McGuinness, "Voice Print Evidence: A Brief Review" (1980) 1(6) *Crown Counsel's Rev.* 9.

16. Tosi, *supra* n. 2 at 45.

17. National Research Council, *supra* n. 10 at 17.

Psychologists, linguists and many other scientists have studied the ear, its physiology and functioning, as well as the process by which people hear and understand sound and speech. In fact, scientists have argued that the ordinary man is more of an "expert" in situations involving speaker recognition than when other sensory modalities are involved. It has been stated that all humans have a built-in ability to identify and distinguish voices.<sup>18</sup> This is particularly relevant in the area of subjective voice identification since it is the lay witness, and not the trained expert, who makes the identification. This proposition is based on a number of facts. First, in humans, very large portions of the brain are employed solely for the production and recognition of speech and related sounds.<sup>19</sup> Second, the human ear is designed to be particularly sensitive to sounds in the speech signal.<sup>20</sup> Third, it is often stated that due to the sophistication of the human ear and the highly developed brain tissue, the ear is a more sensitive detector instrument and sensory organ than the eye.<sup>21</sup>

## B. THE PERCEPTUAL BASIS FOR VOICE IDENTIFICATION

One of the most important issues in voice identification is what perceptual attributes or characteristics of a voice make it distinct from another. There have been a number of studies undertaken to search for sets of efficient and reliable acoustics parameters, that is those that convey the least intraspeaker variability and the most interspeaker variability regardless of the words spoken. The first study of this kind was conducted by Voiers in 1964.<sup>22</sup> Based on the descriptions of thirty-two listeners of a homogenous group of sixteen voices, Voiers was able to isolate four significant perceptual scales: clarity, roughness, magnitude, and animation.<sup>23</sup> A second study was conducted by Holmgren, in which it was found that pitch, intensity, quality and speech rates helped to better classify uniqueness of a voice.<sup>24</sup> In a third study it was found that the subjective dimensions of pitch, pitch variation, rate, clickiness, and breathiness were aspects of a voice used to recognize a speaker.<sup>25</sup> Although these experiments have gone some distance in elucidating the perceptual basis for voice identification, it must be remembered that for the ordinary person listening to speech, it may be difficult to state what descriptors he or she found to be highly salient or memorable. It is quite possible that the

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18. In general see C.H. Millikan and F.L. Darley, *Brain Mechanisms Underlying Speech and Language* (1967), in particular G.F. Rossi and G. Rosadini, "Experimental Analysis of Cerebral Dominance in Man" at 167.

19. *Id.*

20. Flanagan, *supra* n. 8.

21. This is demonstrated by the higher degree of difficulty experienced by hearing impaired people in our society compared to those with visual impairments. This is even more surprising considering that our society is a very visually oriented one.

22. W.D. Voiers, "Perceptual Bases of Speaker Identity" (1964) 36(6) *J. of Acoust. Soc. Am.* 1065.

23. "Roughness" is similar to loudness, "magnitude" to pitch, and "animation" to perceived speech rate.

24. G. Holmgren, "Physical and Psychological Correlates of Speaker Recognition" (1967) 10 *J. of Speech and Hearing Res.* 57.

25. F.R. Clarke and R.W. Becker, "Comparison of Techniques for Discriminating Among Talkers" (1969) 12 *J. of Speech and Hearing Res.* 747.

ordinary person, unaccustomed to describing voice characteristics, would be less able to communicate what he or she is hearing.<sup>26</sup>

### C. PERCEPTION

As an introduction to the literature in the area, it is important to understand the general approach taken by researchers. The generally accepted model of human perception and memory is the human information processing model.<sup>27</sup> This model refers to the human beings' active interaction with information about the world. This model shows that there is differentiation in "earwitness" reports due to differences in veridicality which result from the basic limitations and capabilities of the human information processing system.<sup>28</sup> The amount of divergence in veridicality will increase as the event is perceived and encoded, transferred and stored in memory, and recalled from memory. Thus differentiation occurs at both the perceptual and memorial stages. The dynamic nature of perception and memory, and the limitations of time and space in the information processing system, necessitate that human perception and memory function effectively by being selective and constructive.<sup>29</sup> The following discussion will center on those situational factors which affect perception and memory in ways very relevant to the forensic situation.<sup>30</sup>

The first step in the "earwitness" process is the initial perception of the event itself at the sensory stage. Due to time and capacity limitations, an earwitness must selectively decide what to attend to, and whether or not to encode the information and to transfer it to memory.<sup>31</sup> There are many factors present in the earwitness situation which lead to a less than ideal information processing environment. As the conditions surrounding the observation become less than optimal, the limits of the perceptual range of the ear are approached and the earwitness perception can become less reliable. One of the major factors is the duration or opportunity to hear the voice. It has been stated by numerous writers that in terms of long term memory, the duration of the observation or perception of the stimulus is more important in later recognition than the length of the interval between the perception and being asked to recognize the stimulus.<sup>32</sup> It has also been held that accuracy of the identification and the memory on which it is based is affected by an observation of short duration since this reduces the number of characteristics and details to which a person can selectively

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26. See A. Schmidt-Nielsen and K.R. Stern, "Identification of Known Voices as a Function of Familiarity and Narrow-Band Coding" (1986) 77(2) *J. of Acoust. Soc. Am.* 658 at 663.

27. R.L. Klatzky, *Human Memory: Structures and Processes* (2nd. ed. 1975) at 1-5.

28. Veridicality is defined as the degree of isomorphic representation of what actually occurred in nature.

29. See S.W. Keele, *Attention and Human Performance* (1973) at 135-137.

30. Individual factors such as the age, race and sex of the witness will not be discussed due to the limited scope of this paper. In addition, only studies involving what may be termed "long term memory", as opposed to "short term memory", will be discussed since this is the type of memory involved in voice line-ups used in forensic situations.

31. See J. Marshall, *Law and Psychology in Conflict* (1966) at 13.

32. N.R. Sobel, *Eyewitness Identification: Legal and Practical Problems* (2nd ed. 1986) at 6 and 7. See also G.L. Wells et al., "Guidelines for Empirically Assessing the Fairness of a Line-up" (1979) 3 *Law and Human Behaviour* 285.

attend.<sup>33</sup> Just as in "eyewitness" situations, "fleeting glimpses" can occur in fast moving, threatening or dangerous situations.<sup>34</sup> A second, and very influential factor, is that of the preparedness of the witness.<sup>35</sup> The unexpected or sudden event will affect perception. Unexpected events are harder to perceive clearly than the expected, and perception is often slower since the witness is usually selectively attending to something else and must switch his attention. In some criminal situations the witness is not aware that a crime is to be committed until after it has been committed.<sup>36</sup> Unless there is a clear motive to attend to a situation, not much information is processed. In these situations there is a great probability that no importance will be attached to the event. However, this is related to the duration factor. If a person remains in a situation for a period of time longer than a "fleeting glance" interval, there is a greater likelihood that the person will selectively attend to the situation. In addition, the nature of the crime has some bearing.<sup>37</sup> A third factor is the saliency of the stimulus.<sup>38</sup> This is related to the second factor, in that, if the stimulus is not salient, the person will not selectively attend to it and thus there will not be much information, if any, perceived and encoded. A fourth factor, which is particularly relevant when considering the forensic application of this research, is the level of situational stress or arousal. Many have argued that there is normally less reliability in perception and detection of details when a witness is under extreme stress.<sup>39</sup> In addition, it has been stated that the intensity of the impression is governed by its emotional impact, which is related to situational stress.<sup>40</sup> Thus, there will probably be a difference in impact on a witness depending on whether he is a bystander or a victim.<sup>41</sup> In particular, if the witness' life and safety is immediately threatened, this can have a debilitating effect on perception and memory.<sup>42</sup> However, it is important to remember that if the witness is selectively engaging in a cognitive activity which can help identification, then the above comments are not always correct.<sup>43</sup> In addition, the effect of stress is influenced by the length of the exposure. It has been argued that stress at a level high enough to be debilitating to perception can only be maintained for a brief period of

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33. R. Bull and Brian R. Clifford, "Earwitness Voice Recognition Accuracy" in *Eyewitness Testimony*, G.L. Wells and Elizabeth F. Loftus (1984) at 105.
  34. See R. Buckhout, "Guilt by Fabrication: Psychology and the Eyewitness" in *Psychology Research The Inside Story* (1976) M.H. Seigel and H.P. Zeigler (eds) at 355-378. See also R. Buckhout and G.A. Miller, *Psychology: The Science of Mental Life* (2nd ed. 1973).
  35. For the effect of preparedness on memory, see part II(D) of this paper.
  36. See Buckhout and Miller, *supra* n. 34.
  37. See Wells *et al.*, *supra* n. 32.
  38. K.A. Deffenbacher, "Eyewitness Accuracy and Confidence: Can We Infer Anything About Their Relationship" (1980) 4 *Law and Human Behavior* 243 at 257.
  39. For example see Marshall, *supra* n. 31.
  40. Deffenbacher, *supra* n. 38 at 256.
  41. Brian R. Clifford and R. Bull, *The Psychology of Person Identification* (1978) at preface xiii. See also Appendix A, Chart A of this paper.
  42. Deffenbacher, *supra* n. 38 at 248. See also Allison, *supra* n. 13 at 18 and Sobel, *supra* n. 32 at 6-19.
  43. See Elizabeth F. Loftus, "Reconstructing Memory: The Incredible Eyewitness" (1974) 8 *Psychology Today* 116 or Brian R. Clifford and D. Prior, "Levels of Processing and Capacity Allocation" (1980) *Perception and Motor Skills* 829.

time. After the initial onset of this level of stress, adaption takes place. Thus, the stress actually works as a facilitator of good perceptual performance. Therefore, situational stress that is nondebilitating can be quite adequate in promoting a high level of vigilance.<sup>44</sup>

#### D. MEMORY<sup>45</sup>

It is important to realize that during the encoding phase, a voice perception is stripped of its semantic, grammatical and contextual constraints. Thus, the perception loses its "speech" qualities, and speech becomes strictly a carrier for the non-verbal and abstract properties or characteristics which are then encoded into memory.<sup>46</sup> Therefore, memory for specific words or phrases, that is, speech memory *per se*, is seen as differing from that of memory for acoustic properties.<sup>47</sup> It is unfortunate that most of the studies in the area of verbal memory have dealt with the memory of words and not with the memory of voices.

As was discussed earlier, the preparedness of the earwitness plays an important role in perception.<sup>48</sup> However, this factor also plays a large role in the memory encoding stage. If the witness situation arises suddenly and does not last a long period of time, the type of memory of the event would be called "incidental".<sup>49</sup> Although incidental memory is more unreliable than intentional memory, memory for a voice under incidental conditions at above chance level is a well established finding.<sup>50</sup> However, reliability is increased if the witness is in some way prepared for the event, anticipates it, or is actively attempting to remember details which would aid in identification.<sup>51</sup> It is this type of memory that is involved in most experimental situations. Of course, intentional memory is optimal for providing maximally efficient processing and encoding. There have been a number of recent studies involving voice identification under conditions where the subjects were not warned of a subsequent voice memory test. The first one of this kind was by Saslove and Yarmey.<sup>52</sup> The results of that study showed that there was a highly significant difference between the uninformed group and the informed group, with the informed group performing the

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44. An analogy can be made to the effect of stress on an athlete or performer. See also Deffenbacher, *supra* n. 38 at 246.

45. Due to the length of time between the witness incident and the voice line-up in a criminal case, the listener retrieves the information from long term memory to make the identification. Therefore, only studies involving that type of memory will be discussed here.

46. Edward C. Carterette and A. Barnebey, "Recognition Memory for Voices" in *Structure and Process in Speech Perception* (1975) A. Cohen and S.G. Nootboom (eds).

47. See M.I. Posner, "Coordination of Internal Codes" cited in Carterette, *supra* n. 46.

48. See earlier comments at part II(C).

49. See F. McGehee, "The Reliability of the Identification of the Human Voice" (1937) 17 *J. of General Psych.* 249 at 253.

50. Brian R. Clifford, "Voice Identification by Human Listeners: On Earwitness Reliability" (1980) 4 *Law and Human Behavior* 373 at 382.

51. *Id.*

52. H. Saslove and D.A. Yarmey, "Long-term Auditory Memory: Speaker Identification" (1980) 65 *J. of Applied Psych.* 111.

voice identification task much better. In discussing this result it was stated:<sup>53</sup>

[The results] may be attributed to increased selective attention and encoding processes such as rehearsal of unique voice characteristics. . . . [but] it may also be possible that for some voices, but not others, intention to remember is unnecessary. It may be the case that under certain conditions, some voices are so distinctive in pitch, melodic pattern and rhythm, and quality and respiratory group that retention is high even in the absence of instruction to remember.

In a subsequent study, uninformed and unsuspecting witnesses were accurate approximately one-third of the time in identifying a fairly uniquely accented voice after hearing approximately ten sentences of speech.<sup>54</sup> Clifford, after a brief review of the studies in this area, concluded that voice identification under incidental conditions, and in particular where the exposure is of short duration, has a very low accuracy and reliability rate compared to situations of intentional memory.<sup>55</sup> He also stated that extreme caution should be exercised when it relates to a forensic situation.

The next area of studies involve aural recognition of speakers and the effect of the length of the "retention interval" on accuracy.<sup>56</sup> Although the length of the retention interval is a factor in the success of aural recognition based on long term memory,<sup>57</sup> it has been stated that it is less important in later recognition than the duration of the exposure to the stimulus in the first instance.<sup>58</sup> In essence, long term memory is a function of the amount of initial exposure at the perceptual stage.<sup>59</sup> The first significant experiment in the area was by McGehee in 1936.<sup>60</sup> Listeners were tested at intervals varying from one day to five months after the initial presentation of the voices. Recognition was 83% after one day, 51% after three weeks, 35% after three months and 13% after five months.<sup>61</sup> However, McGehee obtained somewhat different results in a subsequent study: recognition accuracy was 85% after two days, 48% after two weeks, 47% after four weeks and 45% after eight weeks.<sup>62</sup> Thus, the decrease in accuracy for delays up to two weeks in length was similar, but after this, recognition performance did not seem to deteriorate substantially further. After these initial studies there does not seem to have been any interest in the area until a study was conducted in 1980 which attempted to simulate the usual delay in testing auditory memory in the criminal setting.<sup>63</sup> In this experiment,

53. *Id.* at 114.

54. See studies cited in Clifford, *supra* n. 50.

55. Clifford, *supra* n. 50 at 383.

56. "Retention interval" generally refers to the time between the event and its recall. See Elizabeth F. Loftus, *Eyewitness Testimony* (1979).

57. Tosi, *supra* n. 2 at 58.

58. Sobel, *supra* n. 32 at 6-19. See earlier comments at part II(C).

59. This view was succinctly expressed by Dr. Yarmey during the *Laberge*, *infra* n. 95, preliminary inquiry: "Time, in itself, is not important. What is important is how you learned the voice. It is how you processed the voice."

60. McGehee, *supra* n. 40. This study was undertaken in response to the highly publicized case of *United States v. Hauptmann* 180 A. 809 (1935).

61. McGehee, *supra* n. 49 at 262.

62. F. McGehee, "An Experimental Investigation of Voice Recognition" (1944) 17 *J. of General Psych.* 249.

63. Saslove and Yarmey, *supra* n. 52.

half of the subjects were tested for immediate recall and the remainder were tested twenty-four hours later. No significant differences were found. In attempting to explain this result, the researchers offered two explanations:<sup>64</sup>

First, as a class of stimuli, voices may be relatively unique and less subject to interference than is the case of more homogeneous stimuli such as words or digits. . . . Second, the relatively high performance over the 24-hour period may have been a result of the high saliency of cues inherent in angry and hostile-type voices.

Another study found that there was no significant loss of identification accuracy for up to four months.<sup>65</sup> Because of the inadequacy of academic research in this area, Clifford and his associates conducted a number of studies specifically designed to deal with this issue.<sup>66</sup> Based on these studies, it was concluded that the greater delay in carrying out an identification, the greater likelihood that an identification, if made, would be unreliable.<sup>67</sup>

The final stage of the information processing system to be discussed is that of information retrieval from long-term memory. As it will be shown, this area is particularly relevant to the issue of the validity of subjective voice line-ups. The first general area of study has been the structure of the voice array itself. One concern has been that the results in speaker recognition research using listeners have varied considerably depending on the size and composition of the speaker set.<sup>68</sup> Numerous studies have shown, although not conclusively, that six distractors are all that is required.<sup>69</sup> The rationale has been that with a large set of speakers it is more likely that each voice will be identified on the basis of who it is rather than who it is not.<sup>70</sup> The next sub-issue which has generated a large amount of research has been the appropriate duration of the speech sample given. A study by Pollack, Pickett, and Sumbly, considering this issue, found that the larger the speech sample heard, the more accurate the identification due to the greater speech repertoire evidenced in the longer samples.<sup>71</sup> It was also concluded that if continuous speech samples are of a duration longer than one second, this would not significantly improve the percentage of correct identifications.<sup>72</sup>

A second major area of research has involved the nature and quality of the voice samples in the voice array. In terms of content, all of the studies in the area have used speech samples identical by way of semantics, grammar, and context. Thus, it is the abstract characteristics of the voice which are being considered. Reasonably homogeneous voices are usually selected

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64. *Id.* at 115.

65. J.W. Shephard *et al.*, "Identification After Delay" cited in Deffenbacher, *supra* n. 39 at 257.

66. Clifford, *supra* n. 50.

67. *Id.* at 385.

68. Schmidt-Nielsen, *supra* n. 26 at 658.

69. Bull and Clifford, *supra* n. 33 at 110-111; *see also* Hecker, *supra* n. 2 at 25.

70. Schmidt-Nielsen, *supra* n. 26 at 659.

71. I. Pollack *et al.*, "On the Identification of Speakers by Voice" (1947) 26 *J. of Acoust. Soc. Am.* 403 at 405.

72. *Id.* at 406. *See also* K.N. Stevens *et al.*, "Speaker Authentication and Identification: A Comparison of Spectrographic and Auditory Presentations of Speech Material" (1968) 44 *J. of Acoust. Soc. Am.* 1596 at 1598.

prior to the experiment by a panel of listeners utilizing Voiers' attributes.<sup>73</sup> However, it should be noted that some voices are so distinct that it is difficult to find five other voices which are similar. Another factor which will affect the validity of the voice line-up is the quality of the voice samples.<sup>74</sup> McGehee found that disguising the voice by changing the pitch drastically reduced the percentage of correct identifications.<sup>75</sup> However, it has been argued that voice identification should always involve considerations of unintentional "disguise".<sup>76</sup> This is based on the well known fact that physiological arousal or emotionality can create distortions in the way a person speaks, for example, in pitch and intonation.<sup>77</sup>

In concluding this section, it is appropriate to consider the comments of Deffenbach as to what is required for clear optimal information processing.<sup>78</sup> He states that to achieve this result at least three of the following conditions must be met: a warning; situational stress which is nondebilitating, but of an adequate level to promote a high level of vigilance; ample opportunity to observe the target; a high familiarity with the target; a brief retention interval; similar conditions of the target at encoding and testing; and a low similarity of the target to the foils.

A cautionary note should be made prior to turning to the legal issues and the relevance of the above discussed research. Whenever expert evidence is given relating to the validity and accuracy of voice identification, the important issue of whether the research relied on has sufficient probative value for the courts will be raised. In particular, the issue is whether there can be generalization from the laboratory or experimental setting to real life forensic situations. This is important since the judicial system should interpret the data generated for this research simply in terms of the degree of apparent forensic relevance. This lack of "ecological validity" has been recognized by the disciplines involved and it is a matter of some discussion.<sup>79</sup> There are essentially four major differences between the laboratory experiments and real life situations.<sup>80</sup> The first is the difference in conditions relating to the initial perception of the episode, in particular the duration and type of onset. The second difference is evidenced in the total atmosphere of the episode. Crime scenes are emotional events and this is heightened by the fact that many witnesses are victims of the crime. The nature of the crime also plays an important role, and is involved in the third difference, the threat factor. The fourth difference is that in most laboratory settings the witness is asked to identify the same voice or face; a

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73. See previous discussion at part II(B).

74. For example, the amount of similarity between the heard voice at the time of perception and the time of the recognition test can affect validity. A visual analogy could be where the suspect is wearing different clothes or is given a shave or haircut.

75. McGehee, *supra* n. 49 at 269.

76. Bull and Clifford, *supra* n. 33 at 111.

77. *Id.* at 114. See also Saslove and Yarmey, *supra* n. 52 at 113.

78. Deffenbacher, *supra* n. 38 at 246.

79. See U. Niesser, *Cognitive Psychology* (1967); R.S. Malpass and P.G. Devince "Realism and Eyewitness Identification Research" (1980) 4 *Law and Human Behavior* 347; A.L. Lindsay and Gary L. Wells, "What Price Justice? Exploring the Relationship of Line-up Fairness to Identification Accuracy" (1980) 4 *Law and Human Behavior* 303.

80. Clifford and Bull, *supra* n. 41 at 50.

sample which in most cases remains static. However, in real life the witness is faced with some uncontrollable differences in the state of the stimulus. Thus, the lack of realism exists not only at the perceptual and memory encoding stages, but also at the stage of identification and recognition. Even in those experiments which have attempted to stage crimes being committed, identification accuracy has varied greatly depending on a variety of conditions present in the crime itself and the testing situation.<sup>81</sup> Also, the degree of optimality of any forensic situation is difficult to determine and thus, the level of optimality used to determine the accuracy of identifications in laboratory studies is of no use at all.<sup>82</sup> Many researchers have recognized these problems and have begun to advocate a new approach to the problem, that of evaluating research in terms of its possible function in achieving the goals of criminal justice.<sup>83</sup> However, not enough of this type of research has been conducted to date to be of aid to the courts.

### III. THE LEGAL ISSUES

#### A. DEVELOPMENT

The City of Calgary Police Service, through the innovation of Staff Sergeant Dwight Mayor, was the first police department in North America to develop and use voice line-ups. Before the legal issues raised by this novel identification method are discussed, it is important to understand what led to its development. Major has stated that the whole idea stemmed from voice identifications made in relation to wiretap evidence.<sup>84</sup> The difference was to reduce the time frame and emphasize auditory retention. A brief overview of the case law, including some American authorities, will now be undertaken.

##### 1. Origins In Wiretap Law

Due to the nature of wiretap evidence,<sup>85</sup> there has been some discussion by the Canadian courts concerning voice identification. The case of *R. v. Gabourie*, for example, involved a situation in which a police officer, who was not personally acquainted with the three accused before the investigation, subsequently identified their voices from a telephone wiretap.<sup>86</sup> The officer did not have any special training in the identification of voices for court, but he was present on certain occasions for the express purpose of

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81. Gary L. Wells, "Eyewitness Behavior: The Alberta Conference-Introduction" (1980) 4 *Law and Human Behavior* 237.

82. Deffenbacher, *supra* n. 38 at 257.

83. Brian R. Clifford, "The Relevance of Psychological Investigation to Legal Issues in Testimony and Identification" (1971) *Crim. L. Rep.* 153 at 155.

84. This information was acquired during several interviews with Staff Sergeant Dwight Mayor, Criminal Investigations Unit, City of Calgary Police Service.

85. In order to have the tapes of the intercepted communications admitted into evidence, the Crown must prove the accuracy and integrity of the tape (*Colpitts and the Queen* (1966) 47 C.R. 175 (S.C.C.)) and the identify of the voices (*R. v. Sommerville* [1963] 3 C.C.C. 240 (Sask. C.A.)).

86. (1977) 31 C.C.C. (2d) 471 (Ont. Prov. Ct.).

studying the accused's voices.<sup>87</sup> Morrison P.C.J. stated that he was far from satisfied that this identification was satisfactory. However, based on corroborative evidence, he was reasonably satisfied that the voices identified as the three accused were indeed their voices.<sup>88</sup> The discussion of the voice identification in this case was continued in *R. v. Gabourie (No. 2)*.<sup>89</sup> Although Morrison P.C.J. concluded that the voices heard on the tapes were the voices of the eleven accused, he went on to clearly state the basis of this decision and his opinion on voice identification:<sup>90</sup>

I wish to again specify that my findings are based on a combination of two types of evidence; first, direct evidence of voice identification made in this case by a person without special schooling or training in that field, their identification being based on the powers of distinguishing the sounds of human voices, which we all have in various degrees from everyday experience, and secondly, circumstantial evidence directed to test, corroborate and support the accuracy of the identifications of voices based on sound alone. The direct evidence . . . was, by itself, less than convincing in my opinion. I cannot accept the proposition that some of the Crown witnesses seemed to make; that is that even though they do not know a person well, and indeed, in some cases, had never heard a person's voice except on a few occasions on a telephone, that they can positively identify that voice when they hear it again. In my opinion, the most that a witness in that position can say is that the voice now heard resembles a voice previously heard, and indeed, might be the same voice. Accordingly, I consider that direct voice identification in such circumstances requires strong indirect corroborative evidence to make it acceptable.

## 2. American Case Law

The most famous case involving voice identification in the United States is that of *United States v. Hauptmann*.<sup>91</sup> This was a kidnapping case in which the victim's father identified the voice of Hauptmann as being the kidnapper's, three years after the incident. In fact, this case was one of wrongful identification in which an innocent man was sentenced to death. Although most of the numerous other cases in the United States have dealt with voice identification by spectrographic analysis,<sup>92</sup> there have been a few cases in which subjective voice identification has been utilized. For example, in *Palmer v. Peyton*, the Court held that identification of a rapist by the victim in a "voice show-up" involved "grave danger of prejudice" and was "fertile soil" for suggestion since the identification was made on only one aspect of the suspect's person, his voice.<sup>93</sup> Despite cautions such as

87. The officer had only heard some brief conversations of the accused persons before his identification was made. In fact, he had heard one accused speak briefly on three occasions, and the other two only during a questioning session in the holding cells.

88. *Gabourie, supra* n. 86 at 481. In particular, the officer had pre-existing information of which he either had personal knowledge or had been told. In addition, the names of the three accused persons appeared on the tapes.

89. (1977) 31 C.C.C. (2d) 485.

90. *Id.* at 488. The corroborating evidence consisted of persons being present at the place being monitored, based on the address, and the coming and goings on observed. *See also R. v. Rowbotham (No. 4)* (1977) 2 C.R. (3d) 244 at 262 (Ont. Co. Ct.); A case to the same effect is *R. v. Blundell (No. 2)* (1977) 40 C.C.C. (2d) 87 (Ont. Co. Ct.). For further discussion of these types of issues see P.K. McWilliams, *Canadian Criminal Evidence* (2nd ed. 1984) at 400. *See also R. v. Wai Tang Ti (No. 1)* [1976] 6 W.W.R. 129 (B.C. Co. Ct.). This case was interesting in that the conversations were in Cantonese and were then translated into English for the purposes of the prosecution.

91. *Hauptmann, supra* n. 60.

92. *See Tosi, supra* n. 2 appendix.

93. 359 F.2d 199 (4th Circ. 1966).

this one, courts in the United States have routinely allowed juries to consider voice identifications by lay witnesses.<sup>94</sup>

## B. CANADIAN CASES INVOLVING VOICE LINE-UPS

The subjective voice identification procedure has not received much consideration by the Canadian courts, and even when it has these decisions have not been reported.<sup>95</sup> One reason for this lack of case law could be that voice line-ups are used only in serious criminal situations, such as sexual assault, armed robbery, and kidnapping. This is so because of the large amount of time involved in constructing the suspect voice sample and the voice line-up itself, as well as the major expense of expert witnesses.<sup>96</sup> However, this paper will discuss, in varying degrees of detail, three cases on which some information was available.

The case which pioneered this novel method of identification was that of *R. v. Laberge*.<sup>97</sup> Laberge was charged with armed robbery, kidnapping, and unlawful confinement of a family of four.<sup>98</sup> In terms of subjective voice identification, one month after the incident, all four witnesses heard a tape with three voices on it, one being the accused's. Five months after the incident, the four witnesses were involved in a voice line-up situation. The

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94. For example, see *State v. Pinney* 348 N.W. 2d 466 (S.D. 1984).

95. More than one hundred and fifty "voice line-ups" have been held across Canada, and to my knowledge only two cases have been disposed of by trial (other than a case which is currently before the courts involving a serial rapist in Edmonton). In some cases preliminary inquiries have been held, with guilty pleas being entered afterwards (for example *Takahashi*, see discussion at III(B) of text, a case of armed robbery of a Korean store owner). In those cases it is hard to say whether the change of plea was due to other corroborating evidence or the influence of a positive voice identification. In some other cases the pleas were changed before the preliminary inquiry (for example, a number of serial rapists in Toronto.).

This information was acquired during several interviews with Staff Sergeant Mayor of the Calgary City Police Service, and Bryan Newton, Special Prosecutor, and Keith Groves, Prosecutor. In addition, the events have been reconstructed from transcripts from the preliminary hearing and trial in the case of *R. v. Laberge*, unreported, December 7, 1982, J.D. Lethbridge, Queen's Bench. Conviction and sentence upheld on appeal to the Alberta Court of Appeal, August 1983. Application for leave to the Supreme Court of Canada denied, January 1984. Information on the case of *R. v. Jones*, unreported, June 28, 1984, J.D. Calgary, Queen's Bench, was obtained from the prosecutor, Keith Groves.

96. Preparation for the voice line-up takes approximately forty to sixty hours. In addition, many of the expert witnesses are from outside of Alberta, and are often from the United States. The role of these witnesses is discussed in part III(E) of the paper.

97. *Laberge*, *supra* n. 95. A similar case involving visual identification was *United States ex rel. Gilliard v. LaVelle*, 376 F. Supp 205 (S.D.N.Y. 1974). In that case six victims were held captive for periods ranging from two to seven hours. During that time these victims viewed their captor at close range for periods of twenty minutes to six hours. The court held that all victims had adequate opportunities to view their captor.

98. Laberge went to the house of the McLaughlin family. He was masked the entire time, and carried a rifle. The two sons, David aged fifteen and Robert aged nineteen, were home and were taken hostage. The boys were exposed to the robber's voice for a period of two and one half to three hours. At some point Robert, who had some training in radio and communications, told David, "Do whatever he wants but remember everything about him you can". Some time later Dorothy McLaughlin, the mother, arrived home to find her two sons taken hostage. She spent fifteen minutes to half an hour talking to the robber. The father, Edward, arrived home just after the mother. He had the same opportunity as his wife to listen to the voice. He also had an additional opportunity when he was taken to a store and obeyed the robber's commands, such as to open the safe. This involved another half hour of exposure to the robber's voice.

line-up consisted of six foils or distractors and the accused. All four witnesses identified the accused's voice.<sup>99</sup> The Court found Laberge guilty of all counts except one of theft, and sentenced him to twenty-six years. This was based on numerous pieces of circumstantial evidence. The accepted evidence included hair found in the toque worn during the crime, seminal fluid of the same blood type and enzyme grouping of the accused was found where the robber had forced one of the children to perform an act of fellatio, a gun, a toque with distinctively cut eyeholes found in the vicinity of the accused's home in Saskatoon, the accused was of a similar build as the robber, and the voice identification of the four witnesses. The conviction and sentence were upheld in the Alberta Court of Appeal,<sup>100</sup> and application for leave to the Supreme Court of Canada was denied.<sup>101</sup>

The second trial in Alberta to involve the subjective voice identification procedure was *R. v. Jones*.<sup>102</sup> Two men were charged with numerous robberies. With respect to Beauchamp, in thirteen similar incidents, the Crown relied on photographic displays, voice line-ups or both. In a *voir dire* the Court distinguished nine of the incidents based on the fact that the Crown's case was completely dependent on one or both of these types of identification evidence. In each incident, only a few words were spoken by the perpetrators. However, the voice samples of the accused were adequate, but the foils made by the actors and police officers were of varying quality. Mr. Justice Kryczka, in relation to Jones, found the line-up fair but stated that he was less than impressed with the Beauchamp line-up. Mr. Justice Quigley stated that the line-ups were inadequate in that it was obvious to him that in most instances the foils were not speaking spontaneously but were reading from a transcript. However, on lengthy cross-examination by defence counsel, all witnesses except one were of the opinion that the line-up was a difficult exercise. In fact, several witnesses felt intense anxiety on hearing the voices which they identified. In addition, no person other than the two accused were ever chosen.

The well publicized case of *Takahashi* involved a voice line-up.<sup>103</sup> Takahashi, an Edmonton karate instructor, terrorized Edmonton women for more than four years. He wore a ski mask and gloves to hide his identify and was known as the "balaclava rapist". Five of seven victims identified Takahashi's voice from a voice line-up. In addition, there was corroborating evidence of hair and fibre samples, as well as a fingerprint in one instance. After a preliminary inquiry, Takahashi plead guilty to fourteen charges including rape, sexual assault, and unlawful confinement.

### C. ADMISSIBILITY OF VOICE IDENTIFICATION EVIDENCE

As was stated earlier, voice identification research is a multi-disciplinary area involving psychologists, psycholinguists, and linguists. Members of

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99. See *Laberge* transcripts for details as to how the voices were identified. See also Chart B for descriptions of witness reactions.

100. *Supra* n. 95.

101. *Id.*

102. *Id.*

103. Information obtained from Staff Sergeant Mayor.

these disciplines have, in some instances, directly discussed the forensic application of their research.<sup>104</sup> These scientists seem to agree that voices are unique. However, in terms of general comments about the validity and accuracy of voice identification in court, it has been stated that long term memory of voices can be used by any witness in a court of law.<sup>105</sup> It has also been stated that aural examination of voices is the most familiar and natural system of speaker identification and elimination.<sup>106</sup> However, a number of long term research studies have found that "the ability of listeners to identify speakers by their voices alone falls far short of 100% reliability".<sup>107</sup> Others have argued that the criminal justice system must exercise the greatest caution when utilizing voice identification.<sup>108</sup> This is based on what is considered to be a high dependence in voice identification on variables such as speech sample duration, the number of samples in the array, the length of the retention interval, and the ease and effect of disguise.<sup>109</sup> However, this argument is based on perceived similarity between visual and voice identification.<sup>110</sup> I agree that in most respects this is true. However, it is important to note a number of differences. First, identification by the use of voice line-ups is not as common as visual line-ups because of cost and time factors involved.<sup>111</sup> This eliminates many situations where voice line-ups would have been involved. Second, in most of the limited number of situations where this technique is utilized, the perception and memory involved is better. This is due partially to the sophistication of the ear as a sensory device.<sup>112</sup> In addition, in the voice situation there is less post-event opportunity for witnesses to elaborate on information and then integrate it with the original memory of the crime.<sup>113</sup> Therefore, when the use of earwitnesses is criticized, these criticisms must be considered in light of these differences.

Some writers believe that prosecutions based solely on voice identification should not proceed.<sup>114</sup> I agree with this statement. The fallibility of human beings as witnesses has been illustrated in both scientific and legal areas. However, in cases where voice identification has been used, there

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104. However, one should be cautious when considering comments in literature discussing the merits of subjective voice identification. Often the phrase is used not only to refer to aural voice identification but, particularly in American literature, also includes identification using spectrographs.

105. Tosi, *supra* n. 2 at 58.

106. *Id.* at 62.

107. N.I.L.E., *supra* n. 6 at 7 and 39; Cederbaums, *supra* n. 9 at 252.

108. Clifford, *supra* n. 50 at 390; *see also* Bull and Clifford, *supra* n. 33 at 123 and Saslove and Yarmey, *supra* n. 52 at 116.

109. Clifford, *supra* n. 50 at 390.

110. *Id.* at 391.

111. *See* part III(B) of text.

112. *See* part II(A) of text.

113. In eyewitness situations this phenomena is due primarily to the fact that the witness is questioned and asked to give a description of the accused. This does not occur in the voice situation because a description of the suspect's voice will not aid the police in finding the suspect; other types of information are needed to link the suspect to the crime. When a suspect is found, the police obtain a voice sample surreptitiously and do not require the witness' participation at that time.

114. For example *see* Bull and Clifford, *supra* n. 33 at 123.

was other corroborating evidence. I agree with these same authors when they state that each case must be judged on its individual merits.<sup>115</sup> I also agree that in situations where any type of identification would be of low reliability (for example, a fleeting glance or when hearing a person utter a few words), voice identification line-ups can still be a very helpful investigative aid to the police.<sup>116</sup> In addition, it must be remembered that this type of witness evidence is opinion evidence and is admissible as such, and it is up to the judge or jury to decide its weight.

In terms of the approach of the Canadian courts to the introduction of voice identification evidence, the following comments are illustrative. McWilliams states that the identify of a voice is a fact which can be established by evidence of someone who can identify the voice by sound alone.<sup>117</sup> It is also well established that a lay witness can testify as to the identity of the speaker.<sup>118</sup> One of the earliest Canadian cases to discuss this was *R. v. Murray (No. 2)*.<sup>119</sup> In that case the only evidence of the robbery was the voice of one of the robbers, heard by the victim when the accused was taken into custody. Beck J. found the evidence of identity by means of voice identification alone to be sufficient evidence and admissible, although there was some concern as to the weight it should be given due to the circumstances under which the voice was heard.<sup>120</sup>

A more recent case is *R. v. Braumberger*.<sup>121</sup> That case involved an armed robbery of a bank by three masked robbers. Two of the robbers did not remove their masks at any time. The third revealed his face for a short period of time and was identified by direct evidence of a witness. There was circumstantial evidence of identification given by one witness who had heard Coullrer speak during the perpetration of the robbery. This witness subsequently recognized Coullrer's voice while he was in custody. The reasoning and conclusion in *Murray* was accepted by the Court. From this line of cases it can be seen that Canadian courts have found voice identification by the aural method to be admissible.

In discussing the admissibility of subjective voice identifications, cases involving "voiceprint" evidence should be considered since this technique relies, in part, on the same premise as subjective voice identification, that is, the uniqueness of the voice. There have been only two Canadian cases dealing with voiceprints. The first was *R. v. Montani*.<sup>122</sup> The second was *R. v. Medvedew*.<sup>123</sup> In the *Medvedew* case, the discussion of the Court centered

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115. Clifford, *supra* n. 50 at 391.

116. For example, in the *Laberge* case, it was the voice identifications which eliminated all other suspects and allowed the police to then center the investigation on Laberge. The police were then able to collect sufficient corroborating evidence to obtain a conviction.

117. McWilliams, *supra* n. 90 at 399-400.

118. *Id.*

119. (1916) 27 C.C.C. 247 (Alta. C.A.). See also *R. v. Keating* (1919) 2 Cr. App. R. 61 (C.A.A.) and *R. v. Foll* (1957) 118 C.C.C. 43 (Man. C.A.).

120. *Murray*, *supra* n. 119 at 251; see also *R. v. German* (1947) 89 C.C.C. 90 (Ont. C.A.); *R. v. Hancock (No. 5)* (1975) 32 C.R.N.S. 97 (B.C. Prov. Ct.).

121. (1968) 62 W.W.R. 285 (B.C.C.A.).

122. (1974) 26 C.R.N.S. 339 (Ont. C.A.).

123. Unreported, March 22, 1976, Man. Q.B., *aff'd* (1979) 6 C.R. (3d) 185 (Man. C.A.), 43 C.C.C. 434, [1978] 6 W.W.R. 208.

around whether or not the witness was an “expert” in the voiceprint field and the reliability and scientific validity of spectrograms themselves. However, O’Sullivan J.A., in a strong dissenting judgment, did collaterally refer to aural identification:<sup>124</sup>

In my opinion, apart from the alleged scientific basis for analysis of voiceprints, the sergeant’s opinion that the voice on one tape is the same as the accused’s voice on other tapes is no better than the opinion of the jury.

Later on O’Sullivan J.A. stated:<sup>125</sup>

In the case before us, Sergeant Smrkovski’s aural identification of voices was so intimately connected with his use of voiceprint analysis that, in my opinion, his evidence ought not to be admissible unless voiceprint analysis is itself admissible.

It is my opinion that these comments can be interpreted as supporting the use of subjective voice identification procedures, as well as not being entirely negative as to the validity of the identification. First, in subjective voice line-ups, it is the lay witness who gives the opinion evidence as to the identification. In the first quoted comment I believe the Judge was stating that the police officer was not an “expert” in voice identification in that the ordinary man possesses the same “built-in” ability. In this respect it is important to note that in subjective voice line-up situations the judge and jury also hear the voice line-up samples. Although the judge and jury are without any knowledge of which sample is the voice of the accused, they can compare the samples and come to a conclusion as to the fairness of the line-up. Second, the last quoted comment of O’Sullivan J.A. seems to imply or suggest the possibility that if the evidence was strictly of an aural nature, and not made in a “expert” capacity, it may be admissible. It is also clear that O’Sullivan J.A. is skeptical of the second premise of voiceprints, that is, the adequacy of the portrayal and visual comparisons made. However, he does not seem to disbelieve the first premise, that of the uniqueness of the voice. In any event, the majority of the Manitoba Court of Appeal held that the voiceprint evidence was admissible.

#### D. VOICE LINE-UP PROCEDURE<sup>126</sup>

If the court finds that the voice identification evidence is admissible, it is then very important for the line-up procedure to be closely considered. As the Court in *R. v. Martell* held, the effect of a defective line-up is to reduce the weight of the resulting identification; it does not affect the admissibility.<sup>127</sup>

##### 1. Suspect Samples

Samples of the suspect’s voice are obtained surreptitiously during an interview session with a police officer.<sup>128</sup> The samples are obtained in this

124. *Id.* C.R. at 206.

125. *Id.* C.R. at 207.

126. This section will deal with specific aspects of the voice line-up as developed in Calgary. In determining the validity and fairness in the procedure, reference will be made to comments of both an experimental and legal basis.

127. (1977) 32 A.P.R. 578, 23 N.S.R. (2d) 578 (C.A.).

128. There is no problem legally in this respect since it involves a single party consent wiretap allowed under s. 178.11(1)(a) of the *Criminal Code*. The officer interviewing the suspect is aware of the wiretap.

way for a number of reasons. First, this avoids problems of the accused actively disguising his voice.<sup>129</sup> Second, it makes it possible to obtain a sample of normal spontaneous speech in which there is a large repertoire of sounds. The large repertoire of sounds is important since the research has shown that the larger the speech sample, the more accurate the identification. In particular a sample of sixty seconds is more than sufficient.<sup>130</sup> This also facilitates the obtaining of similar foil samples. Third, voice samples of this kind do not require any of the words spoken during the commission of the offence to be present in the sample. This is so because the identification will be made on voice characteristics and **not** on how the suspect repeats the words spoken by the criminal during the offence.<sup>131</sup> The tape obtained is then edited to a sample of approximately sixty seconds duration. The editing is done in such a way that it is not possible to detect that editing has occurred; the result is a natural speech flow in both emphasis and content.<sup>132</sup> The suspect voice sample is then listened to and any other background noises, or particular idiosyncratic habits of the suspect are noted. These possibly identifiable factors are incorporated into the foil samples in order to maintain continuity and similarity.<sup>133</sup> In this respect it should be noted that the original tape is submitted into evidence along with the completed voice sample and foils. In addition, all counsel and the court will be provided with a transcript of the original tape with markings showing how the editing was done.

In terms of the validity of the suspect sample, it is advantageous that the suspect does not repeat the exact words spoken during the commission of the offence. First, this would require that the suspect have knowledge of the taping and thus could lead to changes in the voice characteristics or setting which may not be apparent to the officers involved, but may make a great difference to the witnesses. In addition, the emotional reaction of the witnesses could be increased dramatically, to no benefit.<sup>134</sup>

## 2. Selection of Foils

After the suspect sample is completed a transcript is made. It then becomes necessary to select foils to participate in the voice line-up. The picking of foils is a very lengthy procedure and is very similar to the

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129. See previous discussion at part II(D).

130. *Id.* This is because during the perceptual and memorial states the voice loses its "speech" qualities and is encoded in a more abstract form.

131. If the voice was initially heard over a telephone, the suspect and foil voices are first recorded live and are then transmitted from the particular telephone exchange from which the original call was made to the exchange where the call was received. It is important that attention be paid to environmental reverb, noise, and the inherent distortions in the transmission and recording systems.

132. Mayor, *supra* n. 1 at 7.

133. For example, in *Laberge*, background noises consisted of doors in the holding cells slamming. This was included in each tape by editing into the foils the sound at approximately the same time as in the suspect sample. A maximum of one second variation is allowed. Therefore, these factors appear in all samples in a random way. It is not required that the timing be exact since the witnesses are not aware of when these noises occurred on the suspect tape as they are unaware of which sample is the suspect's. In addition, the witnesses are kept separate and cannot discuss these possibly detectable differences.

134. *Commonwealth v. Marini* 378 N.E. 2d 51 (Mass. 1978).

approach taken by Stevens et al.<sup>135</sup> First, the suspect's voice is considered in terms of its speech characteristics. Psychological and linguistic literature has made it clear that a knowledge of characteristics often recognized in a voice is required in order to find valid foils.<sup>136</sup> Of particular importance to the voice line-up is the age of the suspect, his place of birth, and his ethnic background.<sup>137</sup> The foils are usually public speakers or actors who have similar voice characteristics, and are of a similar age and background.<sup>138</sup> The foils are not allowed at any time to hear the voice of the suspect or the tape of his voice. This is to ensure that the foils do not consciously or otherwise attempt to mimick the accused.<sup>139</sup> In any event, the first step in the selection process for these actors is an interview. Each foil is asked extensively about his background and speech characteristics and these characteristics are determined at this point by actually listening to the natural speech of the foil during the interview. Many foils are rejected at this stage. If the foil does pass this portion of the test, he is then provided with a transcript of the suspect voice sample and is required to provide a number of speech samples in the interview setting. Many foils are rejected at this time as well because it was obvious to the listener that the foil was reading. If the foil passes this second test, he is then advised as to some aspects of the suspect voice sample that are not apparent from the transcript, such as those discussed in the preceding paragraph. Each foil sample is then recorded using the same equipment and medium as was used to obtain the sample of the accused. As stated earlier, extraneous noises are edited into the foil samples to best achieve continuity and similarity.

In terms of the selection of foils, using actors is advantageous. They can use their talents to sound as similar to the accused as possible in terms of all other variables other than distinctive features of the accused's voice, for example, emotional state, vocabulary, and tone.<sup>140</sup> Consideration of the influence of these types of factors on the quality of a line-up was exhibited in the case of *R. v. Goldhar*. In that case the Court set out guidelines for parades: the suspect should not be conspicuously different from all others in "age or build, colour or complexion or costume or in any other particular".<sup>142</sup> Actors are utilized as foils so that the transcript can be presented in a manner appearing to be spontaneous speech. In addition, the process of rejecting potential foils on the basis that the sample does not sound spontaneous is in keeping with the literature.

### 3. Number and Order of Samples

Generally six foils are selected, therefore, the line-up consists of seven

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135. Stevens, *supra* n. 72.

136. See previous discussion at part II(B).

137. See part II(A). Many scientists argue that speech characteristics are formed by the age of ten.

138. In *Laberge* the aid of the director of the Actor's Guild was enlisted to suggest names.

139. The officer in charge of the line-up has never spoken to the accused either. He is only aware of the details necessary to conduct the line-up.

140. The need for a good line-up was illustrated in the case of *R. v. Engel* (1981) 9 M.R. (2d) 279 (Man. C.A.), where a conviction was quashed where the accused was in a line-up with ten burly police officers who were dressed, as a group, different from him.

141. (1941) 76 C.C.C. 270 (Ont. C.A.).

142. *Id.* at 272.

samples. The Alberta Court of Appeal and the Supreme Court of Canada in the *Laberge* case felt that this number was adequate. In addition, the Law Reform Commission of Canada has stated that the number of distractors or foils in a line-up should be at least six.<sup>143</sup> This can be applied to the voice line-up situation since it is conducted in the same manner as a visual line-up.<sup>144</sup> This array size can also be supported by psychological literature discussed previously in this paper.<sup>145</sup> The order of the samples is determined randomly either by a computer generated random order sequence or a random order sheet to avoid any bias, perceived or actual, on the part of the officers involved. In addition, only the officer in charge is aware of the position of the suspect tape in the array.

#### 4. Conduct of the Line-Up

The actual presentation of the voice line-up parallels the procedure used in a live visual line-up. All of the witnesses participate in the line-up the same day and remain separate for the entire length of time in order to avoid any conversation between the witnesses as to identification. Each line-up takes approximately twenty minutes and each witness receives the same standard instructions.<sup>146</sup> In addition, emphasis is placed on concentrating on the voice characteristics and not on what is being said. The procedure used follows the Law Reform Commission's guidelines extremely well. For example, separation of the witnesses both at the line-up itself, as well as at all other times, is in keeping with Rules 201 and 202.<sup>147</sup> The rules regarding instructions are followed as well, in particular those involving what is termed by the experimental research as an "open test" situation, and those to ensure a positive identification.<sup>148</sup> In addition, allowing witnesses to rehear any samples they wish is in keeping with the literature.

Ideally, in every voice line-up there is a psychologist present. This person will not know which voice is the accused's. All the psychologist will be advised of is the type of crime involved and that the witnesses are victims. The psychologist is present for two reasons: as an independent observer of the witness' reactions, and to provide aid for the victim if he or she requires it.<sup>149</sup> At present, the entire line-up in all cases is also videotaped. Both the observations of the psychologist and the videotape are entered as evidence to support the identification. An interesting phenomena has been noted

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143. *Police Guidelines: Pretrial Eyewitness Identification Procedures* (Law Reform Commission of Canada: Study Paper, 1983) at 121.

144. *Id.* at 120.

145. See previous discussion at part II(D).

146. "You are here in regards to (type of offence) of which you were a victim/witness on (date). You will hear seven voice samples, one of which may or may not be the person responsible. The samples will be played in random order. If you feel that you recognize or do not recognize a sample, let us know immediately. If you wish to listen to any one again, you may?"

147. Study Paper, *supra* n. 143 at 52 and 54. See also *R. v. Armstrong* (1959) 125 C.C.C. 56 (B.C.C.A.), where the Court criticized showing a line-up to more than one witness at a time, although the conviction was upheld.

148. See Study Paper, *supra* n. 143 at 63 for Rule 205. In addition, see the discussion by Tosi, *supra* n. 2 at 5.

149. For example, if the witness experiences a regression back to the episode. See Appendix A, Chart B for the witness reactions in *Laberge*.

during many voice line-ups. Many of the witnesses experience a severe physical and emotional reaction. Some psychologists have attributed these reactions to a form of regressive hypnosis with no control.<sup>150</sup> In many cases the witnesses have requested that the tape be turned off because the incident is being relived. In terms of admissibility of evidence or witness reactions on identification, the case of *R. v. Kolnberger* held that these reactions are admissible to lend credibility to the identification.<sup>151</sup> The videotape will most likely be admissible as part of the evidence of the fairness of the line-up, as well as being a dramatic illustration of the reactions exhibited.<sup>152</sup>

## 5. Retention Interval

Because of the severe reaction of many witnesses during a voice line-up, it is the policy of the City of Calgary Police Service to wait for a period of approximately three to five months after an incident before conducting a line-up. This purposeful delaying of the line-up is one of the most controversial issues in the voice line-up procedure. As the psychological literature has shown, the length of the retention interval does affect the reliability and accuracy of the identification, but not as much as the duration of exposure.<sup>153</sup> However, the studies conducted have not produced any consistent data. In particular, this data is not ecologically valid in terms of functional significance and stress present in real life criminal situations. In addition, as shown by Chart A in Appendix A, the time duration between the time of the incident and the time of the line-up does not appear to affect the number of positive identifications.<sup>154</sup> This chart is based on statistics compiled by Staff Sergeant Mayor in relation to the experience of the City of Calgary Police Service with this procedure.<sup>155</sup> As Mayor has stated, the longest retention interval that has resulted in a successful identification has been fifty-one months.<sup>156</sup> However, it should be noted that generally the police will attempt to conduct the line-up as soon as possible in relation to the particular witness involved. Rule 503 of the Law Reform Commission's guidelines states that a line-up shall normally take place as soon as practicable after the arrest of a suspect, subject to some considerations.<sup>157</sup> The report also states that the Canadian courts have not established any guidelines in this regard.<sup>158</sup> In fact, the British Columbia Court of Appeal upheld a conviction based on an identification of a sole witness made eight months after the incident. The

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150. There are similar concerns in the use of hypnosis in forensic matters. But in those situations, a psychologist talks to the subject before the hypnosis session and during the session the person is told to imagine that he or she is only an observer to the events. This cannot be done in the voice line-up situation.

151. (1971) 1 C.C.C. (2d) 121 (A.S.C.A.D.).

152. Videotape evidence of a line-up was allowed in *State v. Newman* 4 Wash. App. 580, 484 P. 2d 473 (1971).

153. See previous discussion at part II(B).

154. See part II(D).

155. Mayor, *supra* n. 1 at 9.

156. *Id.*

157. Study Paper, *supra* n. 145 at 114-115.

158. *Id.* at 115.

majority was impressed with the witness, who made the identification without hesitation.<sup>159</sup>

## 6. The Effect of Stress

As stated earlier, the City of Calgary Police Service conducts voice line-ups only in rare cases. In particular, they look for situational stress levels to determine in which cases voice line-ups may be useful.<sup>160</sup> As earlier discussion revealed, the effect of situational stress levels is another controversial issue.<sup>161</sup> However, the issue is particularly relevant in relation to the use of voice line-ups because this is one of the factors considered in deciding whether or not to conduct a line-up. The data shows that stress is more influential on accurate identification than the length of the retention interval.<sup>162</sup> In addition, the data illustrates that in these situations the victims most probably had time to adapt to the situation, thus reducing the stress level and maintaining a level which facilitated information processing. In addition, if the exposure was of such a duration to allow adaptation to stress, it is probable that the witnesses had time to selectively attend to the speech sample, and could, therefore, be considered partially prepared witnesses. In addition, the severity and violence of the crimes will increase attention.<sup>163</sup> The *Laberge* situation is a prime example of how this could come about.<sup>164</sup> Therefore, the conclusions that prepared listeners perceive more information, as well as encode the information as intentional memory, will increase reliability and accuracy of the identification due to maximally efficient information processing.<sup>165</sup>

## 7. Conclusion On Voice Line-Up Procedure

In the *Laberge* case, the Lethbridge City Police asked Dr. Miron, a psychologist and psycholinguist, to determine the fairness of their voice line-up.<sup>166</sup> The testimony of Dr. Miron, at both the preliminary inquiry and at the trial, reviewed the procedure used, and he concluded that the line-up was credible and that there were no prejudicial factors present. First, Dr. Miron conducted a test by listening personally to the tapes. He concluded that the voices were in fact similar, and the foils read the transcript in a manner so natural that the only distinctions in the voices were the voice characteristics. In addition, he stated that the surreptitious method of obtaining the suspect voice sample led to an accurate voice representation. The second test Dr. Miron conducted was an independent test using untrained listeners.<sup>167</sup> These listeners only received instructions to evaluate

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159. *R. v. Louie* (1969) 129 C.C.C. 336 (B.C.C.A.).

160. Mayor, *supra* n. 1 at 7.

161. See part II(C).

162. See Chart A, Appendix A; and Mayor, *supra* n. 1 at 7.

163. *Supra* n. 161.

164. See n. 95.

165. See previous discussions part II(D).

166. Dr. Miron was, by design, unaware of almost all the case facts so that he could be a more independent observer.

167. Students in Dr. Miron's Honours Introductory Psychology class at the University of Syracuse, New York were the listeners.

the character of each voice as they heard it. The listeners had two tasks to perform: to rate whether they thought that one or more of the individuals on the tapes were guilty of some crime and/or might be lying, and to indicate if any of the voices were repeated on the tapes. The first task was designed to show if there was anything prejudicial in the content or character of the recordings. The results of this first task are interesting. The Laberge voice sample was rated second out of the six samples for being not guilty of a crime or lying. The second task was designed to illustrate the confusion factor, that is the degree of similarity of the voices on the tape. The fourth voice sample was confused most often with that of Laberge. Dr. Miron concluded that the fourth sample and that of Laberge were sufficiently similar to enhance the question of credibility of a correct identification. Based on these results, Dr. Miron concluded that the procedure used was exemplary and should be used as a model for other police agencies.

It can be strongly argued, based on Dr. Miron's results, the relevant experimental research, and discussions by the courts and the Law Reform Commission, that the subjective voice line-up procedure is a fair and valid one.<sup>168</sup> However, if the courts find that voice identification evidence is admissible, and that the line-up is valid, there will be other issues raised during the trial proceedings. These issues will be addressed in the next section of this paper.

## E. OTHER ISSUES ARISING AT TRIAL

### 1. Witness Credibility

A major factor to be considered by the judge or jury in weighing identification evidence, in general, is the credibility of the witness. In fact, the Law Reform Commission recommends, as part of Rule 205, that police officers ask witnesses to indicate the features or describe the overall impression of the person upon which their identification is based.<sup>169</sup> This problem is particularly relevant when the identification is made solely on the voice because judges and jurors alike are often skeptical about the identification. This skepticism is often due to the fact that the ordinary listener is usually "unable to describe the criteria upon which their decisions are based and are unable to justify their conclusions in a court of law".<sup>170</sup> However, it must be stressed that the "earwitness" situation is not any different from the "eyewitness" in this regard, or from the opinion evidence of an ordinary person in any respect. A lay witness knows only the end result; he or she is not aware of what unconscious cognitive processes were involved between the exposure to the situation and the end result.<sup>171</sup> The resulting impression is often an interactive overall impression of

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168. A possible approach could be to have a psychologist with knowledge in one of the relevant areas to be the psychologist who is involved with the police during the voice line-up procedure. If this is done, many of the problems highlighted in this paper could be eliminated.

169. Study Paper, *supra* n. 143 at 67.

170. N.I.L.E., *supra* n. 6 at 23 and 29.

171. Clifford and Bull, *supra* n. 41 at 74.

various specific characteristics. There are many instances in courtrooms where the layman witness is unable to state precisely what factors led him to make a particular decision or conclusion, yet this should not in itself affect the accuracy or reliability of the opinion formed. In terms of case law on this issue, the case of *R. v. Dunlop* held that an identification was unreliable where the witness was unable to establish any characteristics of the offender on which the impression of the accused was based.<sup>172</sup> The opposite view was put forth by the Law Reform Commission, in commentary discussing the above recommendation.<sup>173</sup>

Many people have difficulty articulating the basis for their recognition of a person, and there may be no correlation between a person's ability to describe why they identified a particular person and the accuracy of that identification.

This statement is based on a number of authorities from the area of psychology.<sup>174</sup> The following comments from *R. v. Johnson* are also supportive:<sup>175</sup>

. . . identification may depend, and usually does depend, upon recognition of a complex of features. . . . Usually this complexity of details of facial features and other matters is so involved that it's beyond the scope of the ordinary individual to give more than a cursory description of it. You recognize a whole pattern rather than a mass of details.

Based on the overall case law, the Law Reform Commission's comments and the authorities on which they are based, as well as authorities cited in this paper, I think one could safely conclude that the mere fact that a lay witness has some difficulty describing the characteristics on which an identification was based does not make the identification "unsubstantial conjecture".<sup>176</sup> As stated previously, voice identification is never the only evidence linking the accused to the crime. In addition, it must be remembered that in our dominantly visually oriented society, people have not had the need, and thus, do not have the same experience and practice in describing voices as they have in describing faces and other physical features. Although in some earwitness cases there is a lack of descriptors, this should not be taken as illustrative of a witness report that is less credible than a similar one of a visual nature. In fact, in some situations, this should result in more credibility being given to the earwitness' identification.

## 2. Expert Evidence

In the *Laberge*<sup>177</sup> and *Takahashi*<sup>178</sup> cases, expert evidence was led in the areas of psychology, psycholinguistics, and linguistics. The admissibility of psychological evidence on the topic of identification has been considered in a number of cases. The Ontario Court of Appeal, in the case of *R. v. Audy (No. 2)*, did not allow the testimony of a Dr. Buckhout, a

172. (1982) 36 A.R. 531 (Alta. Q.B.). See also *R. v. Smith*, [1952] O.R. 432 (Ont. C.A.) at 436.

173. Study Paper, *supra* n. 143 at 67.

174. *Id.* at 206 (fn. 189).

175. (1977) 17 N.S.R. (2d) 494 at 496 (N.S.C.A.D.).

176. *Smith*, *supra* n. 172.

177. *Laberge*, *supra* n. 95.

178. *Takahashi*, *supra* n. 95.

psychologist with expertise in the area of eyewitness identification.<sup>179</sup> The Court did not allow this testimony on the dangers of identification evidence since its effect would be to usurp the roles of the judge and jury.<sup>180</sup> However, the court in *Audy* went on to state that there could be a case in which evidence of this kind would be admissible.<sup>181</sup> The case of *R. v. Haughton* also considered this point.<sup>182</sup> Borins C.C.J. held that although expert testimony is not admissible when it deals with matters within the knowledge of ordinary people, it would be admitted if it was helpful to the jury in their deliberations due to the fact that the issues were beyond the knowledge of the average person. In this case, testimony relating to the effect of trauma upon the information processing system in a visual situation was allowed.<sup>183</sup> At the *Laberge* preliminary hearing, a psychologist by the name of Dr. Yarmey was called. His testimony as to the effect of stress and preparedness on long-term memory of voices was admitted. He also commented on emotional reactions to voice samples. Staff Sergeant Mayor has stated that this type of evidence was called in *Laberge* because this was the first time the subjective voice line-up procedure had been utilized. This must have had some influence in the decision of the Court since Dr. Yarmey's testimony was almost identical to what Dr. Buckhout would have provided, with the exception that it was in reference to identification by voice.

In terms of evidence of voice uniqueness, linguists and psycholinguists are usually called to testify. In the *Laberge* case both types of experts were called. As discussed earlier, Dr. Miron was called to testify as to the voice identification process involving the auditory system and the validity of the voice line-up.<sup>184</sup> A Dr. Hogan, one of the top linguists in Canada from the University of Alberta, testified in both *Laberge*<sup>185</sup> and *Takahashi*.<sup>186</sup> Dr. Hogan, most probably due to this specialization in speech perception and recognition, gave the best explanation of the invariant speech theory of all the experts involved. I believe that the courts in both of these cases found the evidence given by these two experts admissible because the evidence they gave was not common knowledge to the ordinary individual. As was stated earlier, we live in a very visually oriented society and most ordinary people have not given much thought or consideration to the auditory sense modality. Thus, the ordinary person will have more difficulty dealing with identification situations involving voices, and they may have many more misconceptions than in visual identification situations. A linguist or psycholinguist, testifying as to the various factors involved, consciously or unconsciously, in voice identification can be of tremendous assistance to a confused jury or judge. In particular, it will benefit the judge or jury when

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179. (1977) 34 C.C.C. (2d) 231 (Ont. C.A.).

180. See *Laberge*, *supra* n. 95.

181. *Audy*, *supra* n. 179 at 236.

182. (1982) 8 W.C.B. 144 (Ont. Co. Ct.).

183. See also *R. v. Sohonow*, [1986] 2 W.W.R. 481 (Man. C.A.) where O'Sullivan J.A. held expert evidence as to witness memory lapse over time was not admissible since it was to be used to impeach witness credibility.

184. See previous discussion in part III(E).

185. *Laberge*, *supra* n. 95.

186. *Takahasi*, *supra* n. 95.

they hear the voice line-up. The trier of fact can make a more informed judgment as to the validity of the line-up, and can more adequately weigh the identification evidence itself.

Since subjective voice line-ups are a new method of proving identification, there has not been a judgment that has dealt specifically with the related expert testimony about voice uniqueness. However, the issue will soon arise.<sup>187</sup> The American position is governed by the authority of *Frye v. United States*.<sup>188</sup> Based on *Frye*, and numerous other American decisions elaborating on *Frye*, a number of factors must be shown: that there is general acceptance of the new scientific technique in the relevant scientific community; that the expert witness is an expert in that scientific method; and that the scientific procedures carried out were proper and correct in the given case.<sup>189</sup> From this brief discussion it can be seen that the issue has been considered in some detail in the United States. This is not the case in Canada. However, the Manitoba Court of Appeal has considered the applicability of the *Frye* test in two decisions. In the *Medvedew* case, the majority took the view that reliability does not go to the issue of admissibility, but to the weight of the evidence.<sup>190</sup> However, O'Sullivan J.A., in dissent, again took the opposite approach and relied on the American case law in support of the *Frye* rule.<sup>191</sup> His view that a technique must be reliable before it is admissible in a court of law was subsequently quoted with approval by the same court in *R. v. Nielsen*.<sup>192</sup> In that case the Crown lead evidence of an anthropologist and a forensic scientist as to footprint comparisons. The anthropologist, during the *voir dire*, had expressed the opinion that no two footprints are identical. The issue then became whether this view was scientifically correct due to a lack of scientific data and study on which to establish the scientific validity of her opinion. In the area of voice identification the situation is similar, except that there is more research and experimentation on which to base the premise that every voice is unique. It must be remembered that the "scientific aura" surrounding techniques such as "voiceprints" is not present in the area of aural voice identification. This is due to two differences: first, it is the lay witness who makes the identification, not the expert; second, expert testimony is presented merely to lend credibility to the identification. As stated earlier, the experts are presented, as was the anthropologist in *Nielsen*, to demonstrate the types of characteristics, possibly unique characteristics, that will assist in an identification, and to draw comparisons and note similarities. This testimony is admissible as long as the witness does not testify as to a scientific theory of uniqueness.<sup>193</sup>

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187. W.D. Myshkowsky, "Expert Evidence: Recent Developments" (1986) 5(1) *Crown Counsel's Rev.* 4. See also H. Leonoff, "Expert Evidence: The Preliminary Issue" (1984) 4(1) *Crown Counsel's Rev.* 2.

188. (1923) F. 1013 (District of Columbia Court of Appeal).

189. See *United States v. Brown* 557 F. 2d 541, (1977) (6th Circuit).

190. *Medvedew*, *supra* n. 123.

191. *Id.* at 199.

192. (1985) 16 C.C.C. (3d) 39 (Man. C.A.), leave to appeal to Supreme Court of Canada refused. See also *Investigative Tests* (Law Reform Commission of Canada: Working Paper 34, 1984) at 24.

193. *Nielsen*, *supra* n. 192 at 69.

## IV. CONCLUSION

In this paper I have attempted to bring the disciplines of psychology, linguistics, and law to bear on the newly developed procedure of subjective voice identification. It is evident that although there is some relevant research in the area of aural voice identification, more forensic realism is required. In addition, there is a great need for studies designed not only to deal with the general problems of realism that exist in all areas of experimental research, but for studies which will test more accurately the actual interaction of factors present in a voice line-up situation. Lawyers and judges alike should also start to consider in greater depth the legal issues surrounding identifications by voice alone, and the advantages and disadvantages of this procedure. It is my feeling that the subjective voice line-up procedure can be valuable in the prosecution of criminal cases, as well as being an effective investigative tool for law enforcement. However, much more study is required in order to avoid the unnecessary problems which have been so evident in the area of visual identification. It is hoped that all disciplines involved can work together to achieve these ends.

## APPENDIX A

## CHART A

WITNESSES		VICTIMS	
Offence Date to Line-up: Date 5 Months		Offence Date to Line-up: Date 5 Months	
Positive Identification	33.3%	Positive Identification	75.5%
No Identification	33.3%	No Identification	25.0%
Inconclusive	0.0%	Inconclusive	0.0%
Wrong Identification	0.0%	Wrong Identification	0.0%
Offence Date to Line-up: Date Over 12 Months		Offence Date to Line-up: Date Over 12 Months	
Positive Identification	46.6%	Positive Identification	72.0%
No Identification	20.0%	No Identification	13.8%
Inconclusive	26.6%	Inconclusive	13.8%
Wrong Identification	6.0%	Wrong Identification	0.0%

## CHART B

## WITNESS REACTIONS — LABERGE VOICE LINE-UP

## VOICE ONE: (LABERGE)

**DAVID:** Uneasy, biting nails, foot movement, bending forward, strong stomach movement.

**DOROTHY:** Eye movement, jerking head to left, rubbing nose, nervous, pale, dropped cigarette, head down, very deep breath, eyes closed, clenched teeth, sighs at end.

**ED:** Rapid blinking, moves feet and legs, leans forward, head down, rapid movement back and forth.

**ROBERT:** Interested, rapid breathing, ear to recorder, pulls lip, turns pale, jerky movements, squinting, swallows hard.

**VOICE TWO:**

**DAVID:** Sat straight and still.

**DOROTHY:** Attentive, shaking head no.

**ED:** Attentive.

**ROBERT:** Uninterested, shaking head no.

**VOICE THREE:**

**DAVID:** Looking at floor, no reaction.

**DOROTHY:** Licks lips, turns head to left, rubs nose, chin on hand, scratches forehead.

**ED:** No visible reaction.

**ROBERT:** Laughing, shakes head no.

**VOICE FOUR:**

**DAVID:** Uninterested.

**DOROTHY:** Attentive, slight lip movement.

**ED:** Scratching right shoulder with pen.

**ROBERT:** Uninterested, shakes head no.

**VOICE FIVE:**

**DAVID:** Attentive, cocked head to left.

**DOROTHY:** Uninterested, shakes head no.

**ED:** Attentive, looking at floor.

**ROBERT:** Laughs, identifies voice.

**VOICE SIX:**

**DAVID:** Attentive.

**DOROTHY:** Eye movement, squints, rubs nose and neck, eyes fixed, plays with pen.

**ED:** Chin on hand, leans back, hand to mouth.

**ROBERT:** Attentive, leans forward, shakes head no.

**VOICE SEVEN:**

**DAVID:** Uninterested, looking at floor.

**DOROTHY:** Attentive, looking at floor.

**ED:** Frowning.

**ROBERT:** Uninterested, shakes head no.