Juror Perceptions of Forensic Evidence

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# Abstract

This study investigated whether potential jurors are aware of the limited validity of most types of forensic evidence.  Three hundred and nine undergraduate students were randomly assigned to one of twelve conditions (control, confession, hair microscopy, fingerprint, fingerprint- revised, DNA, DNA-revised, forensic odontology, criminal profiling, decompositional odour, shoe print, and soil analysis).  Participants read a case vignette outlining a mock homicide that differed only in the type of evidence that was presented. Participants then filled out a questionnaire reporting their verdict decisions, perceptions of the importance of the evidence in reaching the verdict decision, and reliability of the evidence (among other judgments).  It was found that the type of evidence presented significantly affected verdict decisions.  Furthermore, many types of unvalidated forensic evidence were perceived to be as reliable as DNA evidence.  These findings suggest that mock jurors are unaware of the limited validity of most types of forensic evidence.  This study stimulates the need for more thorough testing of the probative value of evidence and the inclusion of expert testimony in court.

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**Juror Perceptions of Forensic Evidence**

**Wrongful Convictions**

The issue of wrongful convictions has come to the forefront of the public eye as a result of a number of highly publicized exonerations and civil litigations that have followed.  Since the inception of the Innocence Project in 1992, the media has been rife with images of individuals who have been convicted of a crime based on unvalidated or improper use of forensic science (Garrett & Neufeld, 2009).  According to Garrett & Neufeld, 51.6% of the individuals exonerated through the Innocence Project by DNA evidence were implicated based on unvalidated or improper use of forensic science, including but not limited to: incorrect and unvalidated hair analysis, incorrect serology, incorrect DNA analysis, unvalidated tire mark analysis, incorrect fingerprint analysis, unvalidated bite mark analysis, impropriety/misconduct/negligence, unvalidated shoeprint analysis, unvalidated use of canines as a forensic tool, and unvalidated voice analysis.  The number of years these individuals spent incarcerated ranged from 1 year to 26 years in prison.  These cases highlight the detrimental effects - physically, psychologically, financially, and interpersonally - of presenting faulty or unvalidated forensic science to a jury.  Furthermore, jury members may not have the scientific understanding to challenge the methodology of a particular piece of evidence and as a result, may give it undue weight when contemplating a verdict decision.

**Reliability and Validity of DNA Evidence**

In 2008, the National Academy of Sciences stated that nuclear DNA (nDNA) evidence is the *only* empirically validated form of forensic science.  The difference between nDNA and mitochondrial DNA (mtNDA) is that mtDNA is approximately 20,000 sequences of nucleotide bases shorter than nDNA; it is these sequences that determine our genetic code (Hans, Kaye,

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Dann, Farley & Albertson, 2010). In addition, mtDNA is passed down directly through the

maternal lineage, whereby all offspring with direct maternal ancestry have the same mtDNA,

making nDNA a much more valuable tool for differentiating individuals (Hans et al., 2010). The

National Academy of Sciences further cautioned that little or no data exist for other types of

forensic science. This is concerning as only 5-10% of criminal trials involve usable DNA

evidence (National Academy of Sciences, 2008), so the utilization of other forms of forensic

science is common in the field of forensics.

**Components of Unvalidated or Improper Forensic Evidence**

Evidence can be determined to be unvalidated or improper based on several

considerations. One aspect of unvalidated evidence is that it describes procedures or techniques

that have not been empirically validated, nor have an established acceptable reliability rating

(Garrett & Neufeld, 2009). In addition, forensic science as a discipline, minus nDNA evidence,

has been criticized for a lack of methodological consistency, research, falsifiability, replication,

and number of peer reviewed publications (National Academy of Sciences, 2008). Further, the

lack of consensus on error rates, potential sources of bias, and interpretation errors are other

factors that were considered when the National Academy of Sciences deemed all forensic

science with the exception of nDNA analysis to be unvalidated evidence.

Another aspect of unvalidated evidence is that it is routinely tested in the absence of

standardized protocols in the laboratory, educational standards, and accreditation (National

Academy of Sciences, 2008). Whereas some forms of forensic evidence are laboratory-based

(e.g., nuclear and mitochondrial DNA analysis, toxicology, and drug analysis) and therefore,

relatively easy to standardize, other forms are interpretation-based (e.g., fingerprint analysis, hair

microscopy, and forensic odontology) and inherently more difficult to establish standardization

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protocols across technicians (National Academy of Sciences, 2008). As a result of these issues, there is a great deal of variability in the quality and credibility of evidence produced in crime laboratories (National Academy of Science, 2008).

In addition to the lack of standardization for laboratory and interpretation procedures, the language used to convey the analysis of forensic science has been criticized for having a presumption of guilt (National Academy of Sciences, 2008). To illustrate, forensic evidence is described as "matching," "consistent with," "similar to," and showing "individualization" with no further explanation of what these terms mean (National Academy of Sciences, 2008). The term "individualization" or "matching" is the most exclusionary of all the categories within forensic science; the definition of these terms vary from one to several markers perceived to be distinct enough to conclude that there is a high probability that the specimen came from the suspect (National Academy of Sciences, 2008). However, without the addition of the statistical probability that the specimen came from another individual, "individualization" or "matching" evidence may be interpreted as inculpatory evidence to the exclusion of all others in a criminal or civil proceeding. Thus, there is a very real possibility that jurors may give excessive weight to forensic evidence based on the way that this evidence is presented in court, in spite of its lack of validation and questionable probative value.

**Admissibility Standards**

Not only are there issues relating to the administration, regulation, and application of forensic science, but the admissibility of forensic evidence in court is also an area of concern. The National Academy of Sciences (2008) have outlined two underlying principles that should serve as the basis for determining admission of evidence into a court of law in the United States: (1) the extent to which a forensic discipline is grounded on a reliable scientific methodology with

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the ability to make reliable conclusions, and (2) the extent to which a forensic discipline may be subject to human interpretation error, bias, or the absence of operational and performance standards.  However, admissibility standards vary across the United States and Canada (National Academy of Sciences, 2008).

Previous attempts to regulate the admission of evidence include legislation such as *Daubert v. Merrell Dow Pharmaceuticals, Inc.* (1993), in which the United States Supreme Court concluded that within civil and criminal trials, a "trial judge must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable".  The Supreme Court specified that expert testimony could be used to establish the reliability of the evidence based on the scientific validity of a particular forensic discipline.  However, due to the adversarial nature of the North American court system, often the ability of council to establish evidentiary reliability depends less on the evidence's scientific merit and more on how the forensic evidence is presented in court (National Academy of Sciences, 2008).  In addition, trial judges have substantial influence over the admission of evidence leaving considerable room for error (National Academy of Sciences, 2008).

The Canadian criteria for admitting expert evidence in court are modelled heavily after the American legal system, emulating the Daubert v. Merrell Dow Pharmaceuticals, Inc. legislation (1993; see Glancy & Bradford, 2007).  Similar to the United States, Canadian provinces have their own legislation governing the admissibility rules for evidence in court (e.g., Alberta Evidence Act, 1980; Evidence Act, R.S.O., 1990).  However, if the matter is under federal jurisdiction, admissibility standards are then outlined by the Canada Evidence Act (1985).

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Admittance of evidence into Canadian courts is less formalized than in the United States and is derived from principles of the Canadian Charter of Rights and Freedoms (1982), which states that evidence must not be obtained in a manner that would infringe on the rights of the accused. For evidence to be admitted, it must also pass the standard of relevancy, where relevancy roughly translates to mean anything that may be used to establish the guilt or innocence of the accused (Paciocco & Stuesser, 2011). This principle of admissibility is largely left up to the discretion of the trial judge (Paciocco & Stuesser, 2011).

**Types of Forensic Evidence**

**Confession.**

A recent finding by Kassin, Bogart and Kerner (2011) revealed that both laypeople and forensic experts perceive confessions to be highly indicative of guilt in police investigations and criminal proceedings. As a result, a false confession can bias experienced forensic experts and investigators to focus on generating supporting evidence rather than on seeking out all relevant evidence (Kassin et al., 2011). Consequently, relevant evidence that does not support the confession may be blatantly or unconsciously ignored, a tendency known as *tunnel vision* (Kassin et al., 2011). The Innocence Project (2012) has revealed that of the 289 exonerations to date, approximately 25% of them were due to false confessions.

Moreover, in approximately 67% of cases of wrongful conviction involving a false confession, a false confession came first, followed by errors of forensic science (Kassin et al., 2011). Often, investigators must work within a time sensitive period under intense pressure to make an arrest. By narrowing their investigation to focus on an individual who confessed, many forensic tests can be interpreted in a way that supports the suspect's guilt (Kassin et al., 2011). Although confessions can be a valuable tool in an investigation, individuals working within the

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criminal justice system should take precautions to ensure that investigator bias does not corrupt other forms of evidence that have the power to exonerate an individual.  Furthermore, standardization and videotaping of interrogation procedures may also help to mitigate the impact of false confessions in criminal investigations.

**Fingerprint Analysis.**

The notion that "no two fingerprints are alike" has become a widely endorsed (albeit, impossible to validate) claim (Cole, 2001).  Subsequently, fingerprint analysis is often viewed as an infallible measure and equated with DNA evidence in terms of its probative value in spite of its lack of validation (National Academy of Sciences, 2008).  Not only is fingerprint analysis given undue probative value, but also a proficiency test conducted by Cole (2001) revealed that one out of five fingerprint analysts incorrectly matched fingerprint samples.

Moreover, Cole (2001) argued that the strong probative value falsely ascribed to fingerprint evidence has transcended the legal realm to have a broader cultural meaning.  The term fingerprint is often used as a proxy for infallibility by other disciplines, for instance, using the terms chemical, electronic, or brain fingerprints.  The cultural perception that fingerprint evidence is highly incriminating has vast legal ramifications if included as evidence in a court of law.

**Hair Microscopy.**

Hair microscopy is one of the most common types of forensic evidence presented in court, as the presence of at least one hair at a crime scene is highly probable (Oien, 2009).  Hair analysis, taken in conjunction with other evidence, is believed to be a valuable forensic tool if there are distinguishing marks or patterns exhibited on the hair that are unlikely to belong to another person or if used as exculpatory evidence (Oien, 2009).  According to Oien, no claims

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can be made about the statistical frequency of a particular hair characteristic; rather, the analyst

makes one of the following three conclusions based on a comparison of the samples: exclusion

(no match), association (several similar characteristics between the known sample and the

evidence), and no conclusion (i.e., differences between the known sample and the evidence are

not sufficiently similar or different to warrant either an association or exclusion).

The issue with hair microscopy is when it is incorrectly conveyed as a measure that can

identify an individual to the exclusion of all others.  The correct interpretation of hair microscopy

involves identifying morphological characteristics (e.g., human or animal, racial group, body

area, color, phase of growth, etc.) to evaluate the number of shared and distinguishing markers

between the hair sample and potential suspects (Oien, 2009).  In addition, the hair strand often

contains distinguishing characteristics such as artificial treatment, damage, texture, nutritional

status, thickness, pigment granule organization, the presence of toxic elements, and

dermatological diseases or diseases that influence the hair (Oien, 2009).  Furthermore,

information about the stage of growth gathered from the follicle is believed to provide some

suggestion as to how the hair was removed from the head: forcibly or through normal shedding

(Oien, 2009).

Although this is only a rudimentary explanation of hair analysis, it is evident that there

are several ways to derive an association or an exclusion of a suspect based on hair samples.

However, the issue of hair microscopy depends largely on the weight that an analyst places on

similar and distinguishing characteristics, which can vary considerably between analysts (Oien,

2009).  Considering that hair evidence is extremely resilient (the oldest of which is 200,000 years

old and was identified as human according to Backwell et al., 2009), if standardization were to

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be established, hair microscopy could prove to be a very powerful forensic instrument for criminal investigations.

**Criminal Profiling.**

The rapid expansion of television shows, novels, and films that focus on law enforcement has sensationalized many criminal investigation procedures.  In particular, criminal profiling has received a great deal of attention in recent years (Muller, 2000).  Criminal profilers use behavioural evidence from the crime scene to deduce information about the offender's personality characteristics and psychopathology (Torres, Boccaccini, & Miller, 2006).  Other common names for criminal profiling include: motivational analysis, offender profiling, behavioral evidence analysis, linkage analysis, signature analysis, investigative analysis, and the current Federal Bureau of Investigation (FBI) name, which is criminal investigative analysis (Torres et al., 2006).  Although popular media often conveys the idea that criminal profiling can identify a single guilty suspect, the use of profiling in actual investigations is used to narrow down a pool of suspects (Torres et al., 2006).  These profiles are generated largely by law enforcement agents, although a small number of mental health professionals report some work in this area (Torres et al., 2006).

Much research has gone into the evaluation of criminal profiling as a procedure, with results ranging.  For instance, Torres et al. (2006) examined inter-rater reliability for classification of crime scenes as organized, disorganized, mixed, or unknown for six FBI profilers and found that there was a 74% agreement across the 64 crime scenes profiled.  However, there was considerable variation between the agents with one rater at only 51.7% agreement.

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Similarly, Kocsis (2003) compared profiles generated by four current or former FBI profilers, six police detectives with profiling training, six police detectives with no profiling training, six clinical psychologists with no profiling training, and six undergraduate students with no profiling training.  Kocsis found that all of the participants generated correct responses at greater than chance levels; however, there were no significant differences between any of the groups (i.e., professional profilers did not generate significantly more accurate profiles than untrained psychologists and students).  An earlier study by Kocsis, Irwin, Hayes, and Nunn (2000) found that professional profilers did generate more accurate predictions when compared to psychologists, self-identified psychics, college students, and law enforcement officers.  However, once again, there was considerable variability between the accuracy of profilers.

Torres et al. (2006) found that among mental health professionals, only 30% thought that criminal profiling was a valid investigative procedure.  Furthermore, these negative perceptions of criminal profiling were exacerbated when the term profiling was used compared to the term criminal investigative analysis (used by the FBI).  Additionally, although mental health professionals were skeptical of the validity and reliability of profiling, many nevertheless stated that it might be a useful law enforcement tool.  The majority of respondents in the aforementioned study agreed that more empirical research to establish the scientific value of criminal profiling would be beneficial.

**Soil Analysis.**

The purpose of soil evidence in criminal investigations is to establish the possible presence or absence of a suspect at the scene of the crime (Sugita & Marumo, 2001).  An analyst can make two possible distinctions between the evidence collected from a suspect and the geographic sample: exclusion (that they do not share a common origin), or no exclusion (there

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are some consistencies between the samples) (Cox, Peterson, Young, Cusik & Espinoza, 2000).

Analysts may discriminate between soils based on physical appearance, by considering

characteristics such as colour, density gradient, particle size, and substances in the soil that cause

the soil particles to clot (Sugita & Marumo, 2001; Cox et al., 2000).  In addition, soil analysts

can distinguish samples based on chemical analyses, which assess the mineral composition and

the presence of decomposed organic material (Sugita & Marumo, 2001).

When analyzing a soil sample, colour discrimination can often provide sufficient

information to exclude many samples if stringent statistical methods are utilized (Sugita &

Marumo, 2001).  However, Sugita and Marumo (2001) cautioned that colour discrimination

alone is not adequate to make a confirmatory association between samples.  Therefore, analysis

of density gradient to isolate organic compounds in the soil can be employed to provide further

physical information about a particular sample (Cox et al., 2000).  In addition, the examination

of organic material analyzed through spectroscopy techniques appears to be highly

differentiating in a forensic context (Cox et al., 2000).

The literature seems to suggest that through the examination of physical and chemical

properties, soil analysis has a high and accurate ability to distinguish between soil samples

(Sugita & Marumo, 2001).  Although the results of research on soil analysis appear promising,

the research is still lacking.  Further studies are required to substantiate these claims, particularly,

if soil evidence is to be included in legal proceedings.

**Forensic Odontology.**

Recently, popular television shows and documentaries such as CSI, Bones, and Forensic

Files have focused on the infallibility of forensic odontology, portraying it as equivalent to the

validity and reliability of DNA evidence (American Dental Hygienists' Association, 2011).

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Forensic odontology can roughly be divided into two classes: identification of remains and bite mark comparison (Sweet & Pretty, 2001).  Most relevant to suspect identification is bite mark analysis.  Bitemarks may be found on someone for a variety of reasons.  For instance, bitemarks may be discovered on an offender as a self-defence mechanism from the victim.  Another possibility is that the victim has been bitten by the perpetrator, which occurs most often in sexual assaults, homicides, and cases of abuse (Sweet & Pretty, 2001).

During the analysis of a bitemark, there are several features that may provide information about the individual who made the mark.  The location of the bitemark may indicate whether it was a defensive or an aggressive act, helping to establish the victim-perpetrator relationship (Sweet & Pretty, 2001).  Through analysis of the shape, size, and patterns of the biting edges, an examiner can compare similar marking impressions created by a known sample to determine if an association or exclusion can be made (Sweet & Pretty, 2001).  In addition, distinct features, such as fractures, rotations, attritional wear, and congenital malformations may also aid in making an association or exclusion of a suspect (Sweet & Pretty, 2001).

However, Sweet and Pretty (2001) outlined several issues in the analysis of bitemarks. First, currently there is no consensus as to how human skin behaves in response to a bitemark. Second, the details present in a bitemark vary greatly depending on the force of the bite; therefore, some bitemarks may be too light to examine.  Third, bitemarks can often resemble other types of injuries.  For example, burn marks from circular objects or injuries from other crescent shaped items, such as heels, hammers, scaffold tubing, defibrillators, and glass bottles may be mistaken for bitemarks.  Therefore, careful inspection of the injury is necessary to first verify that the cause of injury is a bitemark, followed by an analysis of the marking.

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Sweet and Pretty (2001) advocate for the following procedures to ensure that critical information is not lost when analyzing a bitemark: (a) describe the injury in a written document, (b) photograph the injury with a reference scale, (c) take a saliva swab (in the case of a fresh bitemark, DNA evidence may be present), and (d) create a dental impression to test against the bitemark.  Forensic odontologists must then obtain dental information from the individual who bit the victim or perpetrator through an oral clinical examination, photographs, a dental impression, and bite samples (typically on wax or silicone putty) (Sweet & Pretty, 2001).  All of these samples are compared to support the inclusion or exclusion of the individual as a suspect. However, these procedures may or may not be implemented in current laboratories, which can compromise the probative value of the evidence.

**Shoeprint Analysis.**

 The use of shoeprint analysis has been used in crime scenes to reconstruct the events that occurred, but also to place the suspect at the scene of the crime through the analysis of the tread, size, and impressions made by the footwear (Scientific Working Group for Shoeprint and Tire Tread Evidence (SWGTREAD), 2011).  Currently, there is no literature outlining the number of characteristics and/or identifying marks necessary to adequately distinguish one set of shoeprints from another (SWGTREAD, 2011).  Therefore, the number of characteristics used by a practitioner is decided by the individual laboratory and as a result has considerable variation (SWGTREAD, 2011).

Technicians often agree that shoeprint evidence can provide class characteristics, which are identifying features due to the manufacture design (SWGTREAD, 2011).  However, these designs are often shared among one or more shoe designs and therefore, may not be an adequate discriminating measure (SWGTREAD, 2011).  In addition, shoeprints can be differentiated

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based on individual characteristics, such as cuts, scratches, gouges, holes, cracks, tears through

wear, or material that has become attached to the shoe (e.g., gum, rocks, tacks, etc.)

(SWGTREAD, 2011).  It has been claimed that accidental marks found on footwear may be a

promising route to further the analysis of shoeprints with reports of up to 81-100% identification

accuracy (Petraco et. al., 2010).  Although these results are preliminary, they provide a stepping-

stone for further research into the forensic discipline of shoeprint analysis.

　　　　Unfortunately, error rates for shoeprint analysis vary depending on the study.  Peterson

and Markham (1995) contend that the error rate is relatively low compared to other forms of

forensic evidence with 87% accurate conclusions, 0.7% inaccurate conclusion, and 12%

inconclusive.  On the contrary, Majamaa and Anja (1995) examined laboratories across 20

different European countries and found that wide variability exists between analysts.  Attempts

to standardize procedures have been made by SWGTREAD, who have provided guidelines for

practitioners.  Duffy, Hammer, Daeid, and Fraser (2010) reported that when these guidelines are

implemented, there are significant decreases in the variation of results reported by technicians.

Furthermore, Duffy et al. (2010) found that guidelines appear to increase an examiner's ability to

interpret footwear comparisons more accurately.  Although these guidelines are an encouraging

start, wide variability in procedures continues to exist, as these standardization protocols are not

mandated.

**Decompositional Odor Analysis (DOA).**

　　　　Although the detection of chemical excrements from decaying human remains has been

used in police investigations through canines' sense of smell, it is poorly understood how this

process works (e.g., distinguishing human versus non-human remains, old versus new remains,

and living versus dead tissue) (Vass et al., 2008).  Since the literature validating canines' success

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to locate human remains contains mixed results, a new technique termed Decompositional Odor

Analysis (DOA) was designed to imitate the olfactory system of canines used in police units

(Vass et al., 2004).

The purpose of DOA is to identify the chemical signatures expelled by a decomposing

body (Vass et al., 2008).  Factors that affect the specific combination of chemicals expelled

include: temperature, rainfall, barometric pressure, season of burial, the presence of water, soil

type (acidity and alkalinity), burial depth, presence of insects, the coverage and state of the body,

and the weight of the individual post-mortem (Vass et al., 2008; Vass et al., 2004).  Vass et al.

(2008) identified 30 chemical compounds that may be useful in detecting concealed but shallow

burial locations.  These chemicals were collected and outlined in a database claiming knowledge

of all detectable compounds, relative abundances, chemical trends, experimental information,

methodologies, and relevant weather data for DOA (Vass et al., 2008).   Currently, this database

is used by the FBI Counterterrorism and Forensic Science Research Unit in Quantico, Virginia

(Vass et al., 2008).

However, the literature on this topic is meagre at best, with only Vass and his colleagues

actively studying this technique.  Considering that this is a new procedure, having a small group

of proponents is not uncommon or necessarily an issue.  However, the problem arises when a

technique such as DOA is used in criminal investigations and legal proceedings without further

investigation into its validity and reliability.

For instance, in the *State of Florida vs. Casey Marie Anthony* (2011), Vass testified that

chemicals in the trunk of Anthony's car were consistent with a "decompositional event" but that

other chemicals consistent with a decomposing human were not present.  Vass also

acknowledged that these findings could be explained by the earlier transportation of the

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following items: presence of an animal carcass, rotting meat, paint varnish cleaner degreasers, or garbage.  Vass further acknowledged that his procedure did not involve standardized protocols, quality assurance, error rates, and that others have not been able to replicate his findings.  In light of this information, the defence submitted a motion to exclude the evidence prior to the trial (Baez, Mason, & Finnell, 2010).  This motion was subsequently denied as the judge believed that DOA was still useful in assisting jurors to understand the evidence and facts of the case (Perry, 2011).  This example highlights the need for more research to substantiate or invalidate the claims of DOA.

**The Current Study**

Although many forensic techniques appear valid when examined within their own subfield, the lack of standardization and regulation of forensic evidence disciplines permits the possibility for malpractice in criminal investigations and legal proceedings.  Furthermore, although many forensic techniques operate under the guise of objectivity and appear credible, they rely on the use of subjective judgments.  As a result, research investigating the reliability and validity of forensic evidence is vital.

In order to make a strong case that research to determine the validity and reliability of forensic evidence is urgently needed, it would be beneficial to understand how jurors perceive forensic evidence.  Currently, no research has compared juror perceptions of various types of forensic evidence to determine how jurors weight this evidence when reaching their verdict decisions.  Therefore, the aim of this study is to identify how potential jurors in a fictional trial perceive different types of forensic evidence in terms of its impact on verdict decisions, as well as its perceived probative value, and reliability.  Research is crucial in this area to determine if potential jurors are overestimating the credibility of certain types of evidence in criminal

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proceedings.  As a result, the findings of this study have the potential to stimulate research to

validate forensic procedures and to support the mandatory education of jurors on the actual

reliability and validity of forensic disciplines when evidence is presented in court.

<div align="center">**Method**</div>

**Participants**

Three hundred and nine undergraduate students from the University of Calgary

participated in this study in exchange for course credit through the Department of Psychology's

Research Participation System (RPS).  The majority of participants (95.8%) were eligible for

jury duty.  Participants were asked to provide their gender, age, and ethnicity for demographic

purposes.  Of these participants, 78.3% were female.  The average age of participants was 20.2

years old ($SD = 3.16$), with ages ranging from 16 to 41 years of age.  Participants were grouped

into the following categories based on their reported ethnicity: Caucasian (55.3%), Asian

(28.8%), African American (1.3%), Mixed (4.5%), and Other (10%).

**Materials**

**Mock Homicide Vignettes.**

A mock homicide was described in which the victim was a 5 foot, 3 inch, 26-year-old

Caucasian female.  The suspect was described as a 6 foot, 2 inch, 28-year-old Caucasian male,

who was married to the victim.  The information describing the scenario was presented in an

ambiguous fashion to preclude any prejudgments about the husband's actual guilt.  The couple

was described as having a previously happy marriage; however, recently, the couple had been

having some marital issues.  The victim was stabbed with a screwdriver and found in the forest

near the couple's home.

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The circumstances surrounding the victim's death were the same in all conditions, except for the two modified versions that were subsequently added to rectify concerns about the validity of the DNA evidence and fingerprint evidence.  The concerns about the DNA evidence occurred because of the nature of the relationship between the victim and suspect.  Since the victim and suspect were married, participants noted that DNA recovered under the victim's fingernails was not an implausible event.  To remediate this issue, the revised version of the DNA evidence included a fresh sample of the suspect's blood found on the victim's clothing.

In the fingerprint analysis condition, participants expressed concern regarding the suspect's job as a carpenter, which could explain the fingerprint on the murder weapon (i.e., the screwdriver).  For the revised version of this condition, the occupation of the suspect was changed to a computer programmer to remove the use of the screwdriver on a regular basis.

Each case vignette was 1.5 pages doubled-spaced in length and can be found in Appendix A.  Each condition contained all of the information in the control condition, plus an additional piece of evidence.

### Control.

The control condition contained no physical evidence.  All evidence presented in this condition was circumstantial.  The circumstantial details provided included the following: the unstable relationship of the victim and her husband, the disarray of the garage, the missing screwdriver, the suspect's reports of his whereabouts at the time of the murder, and the failure of the suspect to report the victim missing.  These aspects of the case could all be classified as circumstantial evidence that could affect perceptions of the suspect's guilt but could not conclusively prove guilt.

### Confession.

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The confession condition contained a written confession by the suspect obtained post-interrogation.

***DNA Analysis.***

The DNA condition included the presence of skin cells under the fingernails of the victim that matched the suspects' DNA.

***Revised DNA Analysis.***

In the revised version of the DNA analysis condition, the forensic technician found a fresh blood stain on an article of the victim's clothing that matched the suspect's DNA, suggesting a physical altercation between the victim and her husband.  The change in condition was made to ensure that the presence of DNA was not easily explainable by the nature of the marital relationship between the victim and the suspect.

***Soil Analysis.***

The soil analysis condition involved the recovery of a pair of work boots from the suspect's home that were covered in soil that was similar to soil particles found in the area where the victim's body was recovered.

***Fingerprint Analysis.***

In the fingerprint analysis condition, police found a screwdriver within the vicinity of the victim's body with fingerprints that were consistent with the suspect's.

***Revised Fingerprint Analysis.***

For the revised version of the fingerprint analysis, the police found a fingerprint that was consistent with the suspect's fingerprint on a screwdriver within the vicinity of the body. However, in this condition, the suspect's profession was changed from a carpenter to a computer programmer to remove his use of the screwdriver on a consistent basis.  Therefore, the likelihood

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of the suspect's fingerprints on the murder weapon could not be justified by the profession of the suspect.

### Shoeprint Analysis.

The shoeprint analysis condition included a male shoeprint surrounding the victim's body, which was consistent with the suspect's foot size and tread of a pair of work boots within his possession.

### Hair Microscopy.

In the hair microscopy condition, several hair strands were found in the victim's hand that were microscopically consistent to hairs taken from the suspect's head.

### Forensic Odontology.

In the forensic odontology condition, a bitemark was found on the victim's arm, which was consistent with a dental impression of the suspect, suggesting a physical altercation between the victim and suspect.

### Decompositional Odor Analysis (DOA).

For the decompositional odor analysis condition, the chemical composition of the trunk of the suspect's car was analyzed and contained compounds consistent with those expelled by a decomposing body.  The presence of the gases would suggest that the suspect had recently transported a deceased body.

### Criminal Profiling.

In the criminal profiling condition, police began to investigate the suspect's past and discovered from friends and family that the suspect's personality and family background were consistent with the offender profile created by a trained criminal profiler based on the crime scene and position of the victim's body.

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**Juror Questionnaire.**

The juror questionnaire, which can be found in Appendix B, collected participants' demographic information and verdict decisions.  If participants returned a guilty verdict, they were also asked to provide the length of the sentence they recommended.  Participants were also required to report their certainty in the suspect's guilt on a percentage scale where 0% corresponded to absolute certainty that the defendant was innocent and 100% corresponded to absolute certainty that the defendant was guilty.  In addition, participants were asked to indicate on 10-point likert scales their perceptions of the defendant's guilt (1 = definitely no; 10 = definitely yes), the strength of the defence's and the prosecution's case (1 = not very strong at all; 10 = very strong), and the reliability of the evidence presented in the case and of the evidence in general  (1 = very unreliable; 10 = very reliable).

## Procedure

The experiment was administered in person in groups of one to ten.  Within each experimental session, participants were randomly assigned to one of twelve conditions: control, confession, DNA analysis, soil analysis, fingerprint analysis, shoeprint analysis, hair microscopy, forensic odontology, decompositional odor analysis, criminal profiling, revised fingerprint analysis, or revised DNA analysis.  After participants read the vignette describing the mock homicide, participants were asked to complete the questionnaire.  After all participants had completed the questionnaire, the group was debriefed and thanked for their participation.

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**Results**

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## Verdict Decisions

The verdicts (guilty, not guilty) returned by mock jurors in the twelve conditions (control, confession, DNA, shoeprint analysis, soil analysis, fingerprint analysis, hair microscopy, forensic

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odontology, decompositional odor analysis, criminal profiling, fingerprint analysis-revised, and DNA analysis-revised) were submitted to a chi-square analysis. Verdict decisions were dependent on the type of evidence presented, $\chi^2$ (11) = 20.53, $p$ = .039, Cramer's $V$ = .26. As can be seen in Figure 1, in descending order of returned guilty verdicts were confession, criminal profiling, hair microscopy, soil analysis, DNA-revised version, decompositional odor analysis, fingerprint analysis, forensic odontology, fingerprint-revised version, shoeprint analysis, control, and the original DNA condition.

The original fingerprint and DNA case vignettes did not have the intended effect. Several participants indicated that they believed that the fingerprint could have been placed on the screwdriver because the suspect owned the weapon and used it on a daily basis as he was a carpenter. Therefore, to remove the regular use of the screwdriver, his profession was subsequently changed to computer technician. These results indicate that the revised version only served to reduce guilty verdicts further.

Furthermore, in the original DNA condition, participants justified the presence of skin cells under the victim's fingernails due to the potential intimate relationship between the victim and suspect. Therefore to counteract these concerns, a revised version of the DNA condition was created in which a blood sample was discovered on the victim's clothing that matched the suspect's DNA (a less probable situation, suggesting a physical altercation). The results revealed that the revised DNA version did increase the percentage of guilty verdicts relative to the original DNA version.
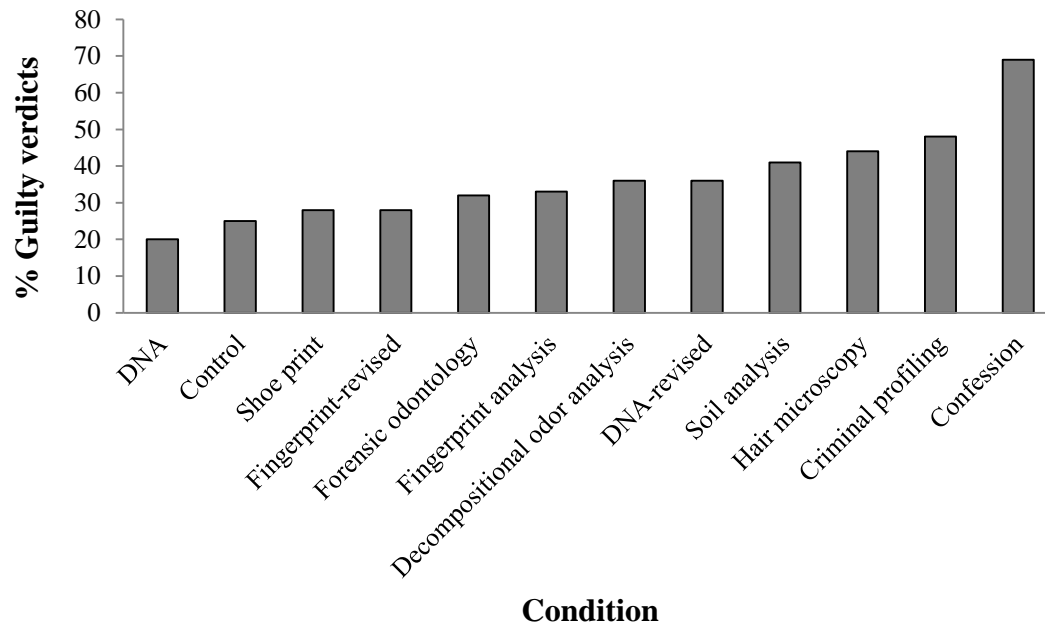
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*Figure 1.* Percentage of guilty verdicts returned by mock jurors as a function of type of evidence.

**Recommended Sentence**

If mock jurors returned a guilty verdict, they were asked to provide a recommended prison sentence in years. A one-way analysis of variance (ANOVA) found no significant differences between the twelve conditions in mean recommended sentence length as a function of the type of evidence presented, $F(11, 101) = 1.53$, $MSE = 55.23$, $p = .133$, partial $\eta^2 = .14$.

**Guilt Ratings**

Mock jurors were asked to rate the likelihood of the defendant's guilt on a 10-point likert scale where 1 corresponded to "definitely not guilty" and 10 corresponded to "definitely guilty". The guilt ratings of the mock jurors in the twelve conditions were submitted to a one-way ANOVA. There were no significant differences between the twelve conditions in perceptions of guilt as a function of the type of evidence presented, $F(11, 297) = 1.76$, $MSE = 3.52$, $p = .060$, partial $\eta^2 = .06$.

**Confidence Ratings**

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The mock jurors were asked to rate their confidence in the defendant's guilt as a percentage, where 0% corresponded to a belief that the defendant was absolutely innocent and a rating of 100% corresponded to a belief that the defendant was absolutely guilty.  These confidence ratings were submitted to a one-way ANOVA, which found no significant differences between the twelve groups in confidence ratings as a function of the type of evidence presented, $F(11, 297) = 1.67$, $MSE = 428.62$, $p = .080$, partial $\eta^2 = .06$.

**Strength of the Defendant's Case**

The mock jurors in each of the twelve conditions were asked to rate the strength of the defendant's case on a 10-point likert scale (1 = not very strong at all; 10 = very strong).  The strength ratings were submitted to a one-way ANOVA, which found no significant differences between the twelve conditions in perceptions of strength of the defendant's case as a function of the type of evidence presented, $F(11, 297) = 1.42$, $MSE = 3.27$, $p = .161$, partial $\eta^2 = .05$.

**Strength of the Prosecution's Case**

The mock jurors in each of the twelve conditions were asked to rate the strength of the prosecution's case on a 10-point likert scale (1 = not very strong at all; 10 = very strong).  The strength ratings were submitted to a one-way ANOVA, which also found no significant differences between the twelve conditions in perceptions of strength of the prosecution's case as a function of the type of evidence presented, $F(11, 297) = 1.04$, $MSE = 4.40$, $p = .415$, partial $\eta^2 = .04$.

**Importance of Evidence in Reaching a Verdict**

The mock jurors in each of the twelve conditions were asked to rate how important the evidence was in helping them reach their verdict decisions on a 10-point likert scale, where a rating of 1 corresponded to "very unimportant" and a rating of 10 corresponded to "very

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important". These importance ratings were submitted to a one-way ANOVA, which found significant differences between the twelve conditions in perceptions of importance as a function of the type of evidence presented, $F(11, 297) = 4.30$, $MSE = 6.19$, $p < .001$, partial $\eta^2 = .14$.

Multiple comparisons using the tukey correction revealed that compared to mock jurors in the control condition ($M = 7.39$, $SD = 2.30$), mock jurors' mean importance ratings did not significantly differ in the confession condition ($M = 7.35$, $SD = 2.42$, $t(297) = .07$, $p = 1.00$, $d = .02$), soil analysis condition ($M = 5.52$, $SD = 2.46$, $t(297) = 2.79$, $p = .188$, $d = .79$), shoeprint condition ($M = 5.48$, $SD = 2.08$, $t(297) = 2.79$, $p = .188$, $d = .87$), hair microscopy condition ($M = 6.44$, $SD = 2.71$, $t(297) = 1.39$, $p = .964$, $d = .38$), forensic odontology condition ($M = 5.43$, $SD = 2.49$, $t(297) = 2.95$, $p = .128$, $d = .82$), decompositional odor analysis condition ($M = 5.64$, $SD = 2.38$, $t(297) = 2.56$, $p = .307$, $d = .75$), criminal profiling condition ($M = 5.91$, $SD = 1.90$, $t(297) = 2.11$, $p = .613$, $d = .70$), or DNA-revised condition ($M = 7.36$, $SD = 2.74$, $t(297) = .05$, $p = 1.00$, $d = .01$). However, compared to the control condition, mock jurors' mean importance ratings were significantly reduced in the original DNA condition ($M = 4.32$, $SD = 2.56$, $t(297) = 4.49$, $p = .001$, $d = 1.26$), the original fingerprint analysis condition ($M = 5.11$, $SD = 2.94$, $t(297) = 3.40$, $p = .036$, $d = .86$), and the fingerprint-revised condition ($M = 5.00$, $SD = 2.65$, $t(297) = 3.50$, $p = .027$, $d = .96$). These findings are depicted in Figure 2.
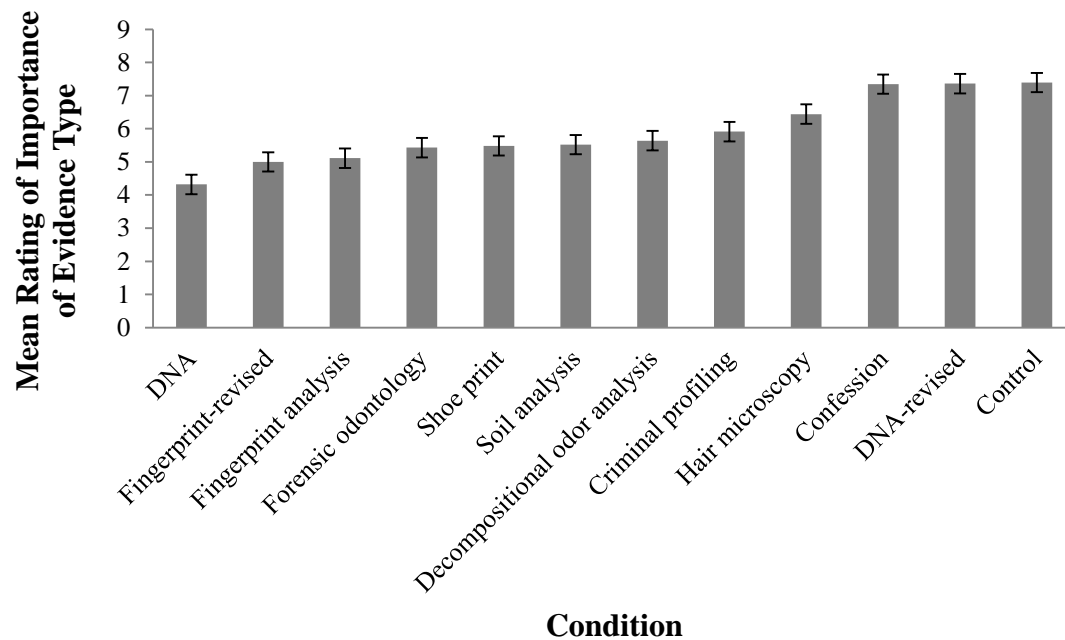
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*Figure 2.* Mean ratings of importance of evidence in reaching verdict decisions on a scale from 1 (Very Unimportant) to 10 (Very Important) for mock jurors depending on type of evidence. Error bars represent standard error of the mean.

**Reliability of Case Evidence Ratings**

The mock jurors in each of the twelve conditions were asked to rate the reliability of the evidence presented in the case on a 10-point likert scale (1 = very unreliable; 10 = very reliable). The reliability ratings were submitted to a one-way ANOVA, which found no significant differences between the twelve conditions in perceptions of reliability of the case evidence as a function of the type of evidence presented, $F(11, 297) = 1.34$, $MSE = 5.23$, $p = .201$, partial $\eta^2 = .05$.

**General Reliability of Evidence Ratings**

The mock jurors in each of the twelve conditions were asked to rate the general reliability of the evidence presented on a 10-point likert scale (1 = very unreliable; 10 = very reliable). The reliability ratings were submitted to a one-way ANOVA, which found significant differences

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between the twelve conditions in perceptions of general reliability of the evidence as a function

of the type of evidence presented, $F(11, 297) = 7.81$, $MSE = 3.14$, $p < .001$, partial $\eta^2 = .22$.

Multiple comparisons using the tukey correction revealed that compared to the control

condition ($M = 7.86$, $SD = 1.92$), mock jurors' mean general reliability ratings did not

significantly differ for the confession condition ($M = 6.92$, $SD = 1.87$, $t(297) = 1.93$, $p = .737$, $d$

$= .50$), DNA ($M = 7.56$, $SD = 1.53$, $t(297) = .61$, $p = 1.00$, $d = .17$), fingerprint analysis condition

($M = 6.63$, $SD = 1.42$, $t(297) = 2.57$, $p = .304$, $d = .73$), hair microscopy condition ($M = 6.72$, $SD$

$= 1.90$, $t(297) = 2.33$, $p = .457$, $d = .60$), fingerprint-revised condition ($M = 7.12$, $SD = 1.62$,

$t(297) = 1.51$, $p = .937$, $d = .42$), or DNA-revised condition ($M = 8.24$, $SD = 1.48$, $t(297) = -.78$,

$p = 1.00$, $d = .22$).  However, compared to the control condition, mock jurors' mean general

reliability ratings were significantly lower in the soil analysis condition ($M = 5.56$, $SD = 1.97$,

$t(297) = 4.81$, $p < .001$, $d = 1.18$), shoeprint analysis condition ($M = 4.96$, $SD = 2.07$, $t(297) =$

$5.94$, $p < .001$, $d = 1.45$), forensic odontology condition ($M = 5.96$, $SD = 1.97$, $t(297) = 3.99$, $p =$

$.005$, $d = .98$), and decompositional odor analysis condition ($M = 5.88$, $SD = 1.92$, $t(297) = 4.05$,

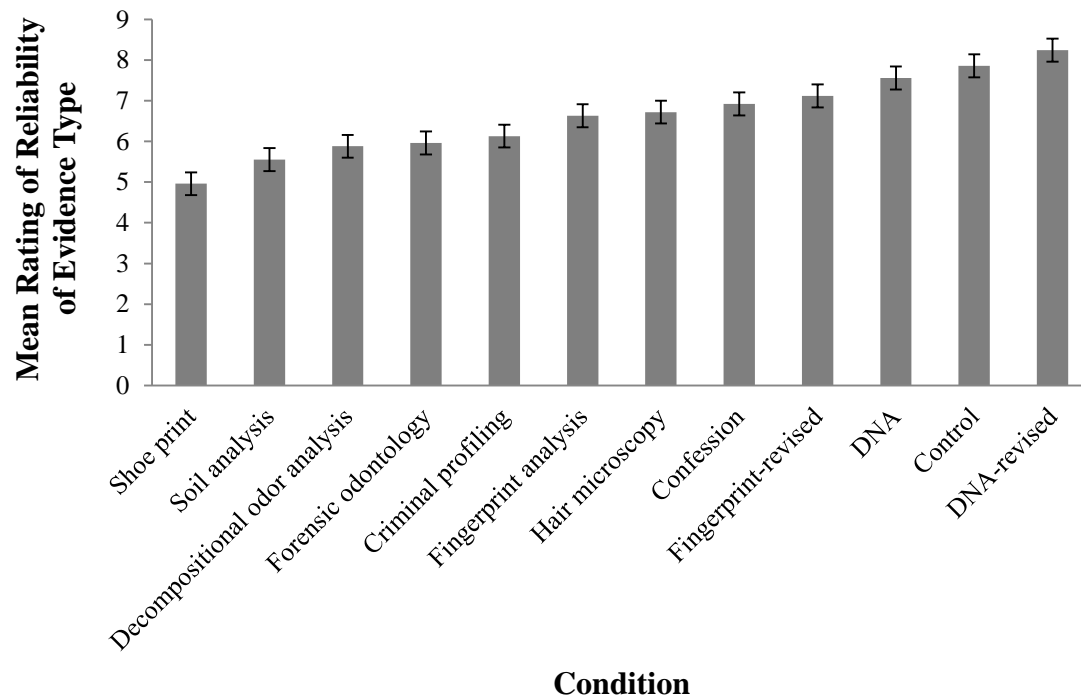$p = .004$, $d = 1.03$).  These findings are depicted in Figure 3.

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**Condition**

*Figure 3.* Mean mock juror ratings for general reliability of evidence type on a scale from 1 (Very Unreliable) to 10 (Very Reliable) as a function of type of evidence. Error bars represent standard error of the mean.

## Discussion

The goal of the present study was to identify how potential jurors perceive different types of forensic evidence in a fictional trial to determine: (a) their relative impact on verdict decisions, (b) their perceived importance in making a verdict decision, and (c) their perceived reliability. It was found that the type of evidence presented significantly influenced whether mock jurors returned a guilty verdict. Furthermore, beliefs about the importance of the evidence in making a verdict decision and perceived reliability of the evidence in general significantly differed depending on the type of evidence presented.

Specifically, mock jurors were much more likely to return a guilty verdict if they believed the suspect had confessed (69% guilty verdicts) relative to when any other type of

evidence was presented.  In addition, mock jurors reported that confessions were relatively

important in reaching their verdict decision.  However, mock jurors indicated that the general

reliability of confession evidence was only moderate.  One interpretation of these results is that

mock jurors are aware of the fallibility of confessions; nevertheless, this insight was not reflected

in their verdict decisions or how heavily they weighted confessions in this case.  These findings

highlight the powerful impact that a confession can have on a jury in spite of skepticism about

the reliability of confessions in general.

These conclusions are congruent with previous literature by Kassin et al. (2011), which

found that both experts and laypeople perceive confessions to be highly indicative of guilt.  This

may be particularly problematic in cases of coerced confessions (when a suspect confesses as a

result of manipulative or gruelling interrogation conditions; see Narchet, Meissner, & Russano,

2011).  A confession from a suspect can lead investigators to focus on generating confirming

evidence to support the confession (whether true or not), a phenomenon known as tunnel vision.

Indeed, a high percentage of false confessions have been exposed through the Innocence Project

(25% of 289 exonerations; www.innocenceproject.org); in 2/3 of these cases there is evidence

that tunnel vision played a role in the investigations and subsequent convictions of these

wrongfully convicted individuals.

These findings clarify the need for standardized protocols when obtaining confessions

and explanations to jurors of the potential fallibility of confessions, potentially through expert

testimony or judicial instructions.  As a result, jurors may more accurately weight other forms of

evidence along with confessions instead of basing their verdicts on the confession alone.  Of

course, there is the possibility that the confirming evidence collected during an investigation to

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support a confession may be given undue weight in light of the confession; this is an empirical issue that remains unresolved.

Differences between the type of evidence presented and percentage of guilty verdicts became less distinct in the other conditions.  However, criminal profiling received the second highest number of guilty verdicts (48%), but comparatively low ratings on importance and reliability in general.  This may indicate that jurors are aware that there is little research into the accuracy of profilers' predictions and that criminal profiling is not an exact science (Torres et al., 2006).  Nevertheless, mock jurors' verdict decisions were clearly influenced by criminal profiling evidence in this study, likely due to the common depiction by the media of criminal profiling as a verified and accurate tool in criminal investigations (Torres et al., 2006).  Similarly, hair microscopy evidence led to a high number of guilty verdicts (44%, third to confession and criminal profiling), but received relatively moderate ratings in general reliability and importance in reaching a verdict.  Taken together, these findings suggest that mock jurors' perceptions of evidence may not be accurately reflected in their verdict decisions.

One reason for this finding could be due to the scientific discourse used to convey certain types of evidence.  As the National Academy of Sciences (2008) has revealed, the language in which evidence is presented often has a presumption of guilt.  In the case vignette that contained hair microscopy evidence, the hair sample found in the victim's hand was described as "microscopically consistent with" the suspect's hair sample.  However, in spite of mock jurors reporting moderate beliefs in the importance and reliability of hair microscopy evidence, they returned a relatively high number of guilty verdicts in the hair microscopy condition.  It is possible that regardless of mock jurors' general beliefs regarding the importance and reliability of hair microscopy, the scientific language used to describe this condition sounded very credible

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to mock jurors, which increased the likelihood for mock jurors to return a guilty verdict. This

finding is likely generalizable to how jurors make decisions in court, as evidence is typically

presented using similar language in real trials.

One surprising finding was that DNA evidence had relatively little impact on verdict

decisions. Specifically, the original DNA condition returned the fewest guilty verdicts (20%)

and the revised DNA version returned guilty verdicts only 36% of the time. Considering the

DNA conditions were the only vignettes that contained evidence that previous literature has

established in terms of its reliability and validity (National Academy of Sciences, 2008), this

condition was expected to return the highest number of guilty verdicts.

Conversely, DNA evidence was accurately reported as the most reliable type of evidence

in general and high in importance in reaching a verdict decision. These data suggest that the low

number of guilty verdicts may have been due to the specific DNA evidence presented in the case.

Many mock jurors made comments to the researcher justifying the presence of DNA in the

original condition. As the victim and the suspect were married, their intimate relationship was

seen as just cause for the suspect's skin cells under the victim's fingernails. A second DNA

condition was added in an attempt to minimize the plausibility of the suspect's DNA on the

victim. However, in the second DNA condition, a number of mock jurors also justified the

presence of the suspect's blood on the victim due to the intimate relationship between the two.

Case vignettes involving a suspect who is a stranger to the victim may increase the impact of

DNA evidence on verdict decisions.

It is interesting to note that evidence that is perceived to be highly reliable such as DNA

can nonetheless fail to have an impact on mock jurors' verdict decisions depending on the

circumstances presented. This suggests that mock jurors took their role seriously when asked to

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deliver a verdict decision.  Real jurors are likely to take their job even more seriously because of

the consequences to the suspect if a false guilty verdict is returned; they may be especially likely

to consider the context as a result.  Specifically, DNA evidence may be viewed as having more

probative value in cases where a stranger is the alleged perpetrator, and seen as less inculpatory

in cases where the suspect is a non-stranger.

Interestingly, although the control condition received the lowest number of guilty verdicts

(25%) aside from the original DNA condition, it received the highest ratings of importance in

reaching a verdict decision.  Considering that 75% of mock jurors in the control condition

returned a not guilty verdict, these results suggest that the lack of evidence in the control

condition was viewed as an important factor in determining that the defendant was *not* guilty.

However, the control condition was also rated as very high (second to DNA evidence) in general

reliability of the evidence.  This finding is concerning given that the only evidence presented in

the control condition was circumstantial details present for all conditions (i.e., the unstable

relationship between the victim and her husband, the disarray of the garage, the missing

screwdriver, the timing of the murder, the suspect's lack of alibi for the time of the murder, and

the inability of the suspect to report the victim missing).  It is possible that jurors are unaware of

the differential strength that certain types of evidence (e.g., circumstantial versus physical

evidence) can add to a case, which is extremely problematic if this finding generalizes to how

jurors view evidence in actual trials.

Furthermore, the original DNA, the original fingerprint, and the revised fingerprint

conditions were the only evidence types that were rated significantly lower in importance than

the control condition.  As mentioned previously, the potential issues with the original DNA

evidence may explain the lower importance ratings for this condition.  A similar argument may

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apply to the fingerprint evidence, as many mock jurors stated that the fingerprint in the original

fingerprint and revised fingerprint conditions could have been placed on the murder weapon (a

screwdriver) through regular use of this tool.  All three of these conditions received relatively

low guilty verdicts, but received high reliability in general ratings.  As mentioned previously, it

is plausible that the manipulation in these three case vignettes may not have had the intended

effect due to the fact that the alleged perpetrator was not a stranger to the victim and owned the

murder weapon.

   If the original DNA, original fingerprint, and revised fingerprint conditions are taken out

of the analysis, all types of evidence (DNA, confession, hair microscopy, criminal profiling,

decompositional odor analysis, soil analysis, shoe print analysis, forensic odontology, and the

control) were rated as equally important in reaching a verdict decision.  Considering that DNA

evidence is the only form of evidence that has been empirically validated (National Academy of

Sciences, 2008) and that there is a paucity of research attempting to validate other forms of

evidence, mock jurors' lack of discrimination between the evidence types is highly problematic.

   In addition, mock jurors' ratings of reliability significantly decreased in the soil analysis,

shoe print analysis, forensic odontology, and decompositional odor analysis conditions compared

to the control condition.  However, the DNA, fingerprint evidence, confession, hair microscopy,

and criminal profiling conditions were all seen as equivalent in reliability to the control

condition.  These results indicate that mock jurors are not aware that most types of forensic

science have not been empirically established.

   The conclusion that DNA evidence is weighted as equally reliable and important in

reaching a verdict decision as many other types of evidence is concerning given that only

approximately 5-10% of cases in court involve useable DNA (National Academy of Sciences,

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2008). Consequently, other forms of forensic evidence, such as those examined in this study, are often relied on in court to establish guilt or innocence. The fact that jurors may fail to discriminate between DNA and other forms of evidence is troubling given that there are little or no data substantiating the validity and reliability of these forensic disciplines (National Academy of Sciences, 2008).

**Implications**

With the exception of defendants who choose to have their verdict decided by a judge, the decision to convict an alleged perpetrator for an indictable offense in Canada hangs solely on the verdict of jurors (*Canadian Charter of Rights and Freedoms*, 1982). However, jurors appear to be relatively unaware of the limited validity of most types of forensic evidence. Consequently, evidence that is presented in court should be followed by education on the current scientific standards for establishing the reliability and validity of evidence. In addition, jurors should be informed about the current state of the evidence presented in court in relation to the scientific standards of reliability and validity.

This study demonstrated that perceptions of how important evidence is in reaching a verdict decision and reliability ratings in general are not necessarily reflected in the number of guilty verdicts that mock jurors return. In other words, mock jurors' beliefs about particular types of evidence may not be applied when reaching a verdict decision. One suggestion to reduce this discrepancy could involve teaching jurors about cognitive biases that may impact their verdict decisions. By being cognizant of the discrepancy between the perceptions of forensic evidence presented in the media and the actual state of forensic evidence, it is possible that these cognitive biases could be mitigated.

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Although the legal system has much to gain through the education of jurors, the results of this study can also extend to law enforcement officers. Those who lead criminal investigations are also subject to a variety of biases pertaining to forensic evidence. By providing information to law enforcement agents about the potential for errors when collecting, interpreting, and/or analyzing forensic evidence, officials may attempt to be more scrupulous when investigating an alleged perpetrator. Consequently, false accusations against innocent suspects and wrongful convictions could be reduced by teaching criminal justice officials about the harmful impact of tunnel vision and how it is important to keep an open mind throughout an investigation in order to reduce this effect.

Forensic science is likely to remain an essential component of court proceedings to establish the innocence or guilt of those accused of committing criminal acts. As has been demonstrated in this study, the type of forensic evidence presented can impact mock jurors' decision to return a guilty verdict in a case. Unfortunately, there are few research studies on the validity and reliability of forensic evidence, minus DNA evidence. The findings of this study underscore the need for research to substantiate or refute the validity and reliability of forensic science disciplines.

**Limitations and Future Directions**

As these data were drawn from an undergraduate student population limited to those who were enrolled in psychology classes, the results may not be representative of an actual jury. Specifically, the demographics of a jury may be more variable than the typical undergraduate population. In addition, students were aware that this was a fictional case and that there would be no real ramifications of their verdict decisions; as a result, the motivation of the students was likely lower than that of real jurors in an actual trial. To increase the generalizability of the

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findings of the current study and examine the effects of enhanced motivation, future researchers could analyze jury decisions in actual trials.

The discrepancy between the reliability of the specific evidence presented in the case vignette (a non-significant finding) and the reliability of the type of evidence in general (a significant finding) suggests that the case vignettes may not have had the intended effect. This could have been due to the potential intimate relationship between the victim and the suspect, which may have confounded the original DNA condition. In addition, mock jurors were able to justify the fingerprint condition since the weapon was owned by the suspect who used it on a regular basis due to his profession (carpenter). Mock jurors further justified the fingerprints on the screwdriver in the fingerprint revised condition, simply due to the fact that the suspect owned the screwdriver. Future directions could benefit by using case vignettes where the victim and the suspect do not have a known relationship and the murder weapon was not owned by the suspect. As a result, the presence of a fingerprint on the weapon and DNA on the suspect would be less justifiable.

**Conclusion**

The major conclusion that can be drawn from the present study is that jurors lack adequate knowledge of the inculpatory value of all types of evidence. Considering the damning nature of a wrongful conviction, it is of the utmost importance that we mitigate the inaccurate perceptions surrounding forensic science. This study supports the necessity for more thorough examinations of the probative value of forensic evidence and the inclusion of expert testimony in courts of law.

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**Appendix A**

**Case Vignettes**

**Control Condition**

Jacob Smith is a 6 foot, 2 inch, 28-year-old Caucasian male who is accused of murdering his wife, Sarah, who was a 26-year-old Caucasian female approximately 5 feet and 3 inches in height. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours, friends, and family of the Smiths indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smiths' home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly. Upon searching the Smiths' house, the police noted signs of disarray in the garage, including several overturned paint cans, and a missing screwdriver.

Jacob states that on August 22nd he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools. Jacob then claims that he took a shower, made a sandwich for dinner and then

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watched television for the remainder of the night; he described the contents of the programs in detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night. Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah. Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home. At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. As police questioned Jacob's family and friends, the people they interviewed were consistently shocked by the allegations against Jacob and stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Confession Condition**

Jacob Smith is a 6 foot, 2 inch, 28-year-old Caucasian male who is accused of murdering his wife, Sarah, who was a 26-year-old Caucasian female approximately 5 feet and 3 inches in height. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours, friends, and family of the Smiths indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours

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observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of

Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's

whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smiths' home.

The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm

on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her

body, which had killed her almost instantly. Upon searching the Smiths' house, the police noted

signs of disarray in the garage, including several overturned paint cans, and a missing

screwdriver.

Jacob states that on August 22nd he came home from work, as usual, around 5:00pm.

Sarah was gardening in the backyard and had left the garage open so she could easily access her

gardening tools. Jacob then claims that he took a shower, made a sandwich for dinner and then

watched television for the remainder of the night; he described the contents of the programs in

detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When

the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she

had not showed up for work that night. Jacob tried to call her cell phone various times, which

was verified with phone records; however, he could not reach Sarah. Jacob did not become

concerned over Sarah's disappearance until the next day after he arrived home from work and

Sarah was still not at home. At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared

distraught as is typical of a person in this situation. Jacob cooperated with the police and

answered all questions promptly and concisely. As police questioned Jacob's family and friends,

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the people they interviewed were consistently shocked by the allegations against Jacob and

stated that he had always been a very outgoing, polite, and helpful individual with no previous

violent tendencies.

Police interviewed Jacob for several hours after his arrest. At first Jacob vehemently

denied the allegations that he murdered his wife. However, he later provided a written

confession after being confronted by the police about the inconsistency between his story and the

neighbours' reports of them fighting, the state of the garage, and the missing screwdriver.

**Original DNA Condition**

Jacob Smith is a 6 foot, 2 inch, 28-year-old Caucasian male who is accused of murdering

his wife, Sarah, who was a 26-year-old Caucasian female approximately 5 feet and 3 inches in

height. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know

their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am

and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local

hospital five days a week. Neighbours, friends, and family of the Smiths indicated that they have

always appeared to be a happily married couple who frequently enjoyed long hikes in the

mountains together and taking vacations as much as possible. However, recently neighbours

observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of

Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's

whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smiths' home.

The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm

on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her

body, which had killed her almost instantly. Upon searching the Smiths' house, the police noted

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signs of disarray in the garage, including several overturned paint cans, and a missing

screwdriver.  The forensic pathologist also discovered skin cells underneath Sarah's fingernails

that matched Jacob's DNA.

Jacob states that on August 22$^{nd}$ he came home from work, as usual, around 5:00pm.

Sarah was gardening in the backyard and had left the garage open so she could easily access her

gardening tools.  Jacob then claims that he took a shower, made a sandwich for dinner and then

watched television for the remainder of the night; he described the contents of the programs in

detail to the police.  At 8:00pm, Jacob said that he heard Sarah leave and close the garage.  When

the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she

had not showed up for work that night.  Jacob tried to call her cell phone various times, which

was verified with phone records; however, he could not reach Sarah.  Jacob did not become

concerned over Sarah's disappearance until the next day after he arrived home from work and

Sarah was still not at home.  At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared

distraught as is typical of a person in this situation.  Jacob cooperated with the police and

answered all questions promptly and concisely.  As police questioned Jacob's family and friends,

the people they interviewed were consistently shocked by the allegations against Jacob and

stated that he had always been a very outgoing, polite, and helpful individual with no previous

violent tendencies.

**DNA-Revised Condition**

Jacob Smith is a 6 foot, 2 inch, 28-year-old Caucasian male who is accused of murdering

his wife, Sarah, who was a 26-year-old Caucasian female approximately 5 feet and 3 inches in

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height. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours, friends, and family of the Smiths indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smiths' home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly. Upon searching the Smiths' house, the police noted signs of disarray in the garage, including several overturned paint cans, and a missing screwdriver. The forensic technician also found a blood stain on an article of Sarah's clothing with a fresh drop of Jacob's blood on it.

Jacob states that on August 22nd he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools. Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

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Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night. Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah. Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home. At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. As police questioned Jacob's family and friends, the people they interviewed were consistently shocked by the allegations against Jacob and stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Soil Analysis Condition**

Jacob Smith is a 6 foot, 2 inch, 28-year-old Caucasian male who is accused of murdering his wife, Sarah, who was a 26-year-old Caucasian female approximately 5 feet and 3 inches in height. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours, friends, and family of the Smiths indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

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Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smiths' home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly. Upon searching the Smiths' house, the police noted signs of disarray in the garage, including several overturned paint cans, and a missing screwdriver. The police also found a pair of work boots covered in soil consistent with the soil in the area where Sarah's body was discovered.

Jacob states that on August 22nd he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools. Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night. Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah. Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home. At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. As police questioned Jacob's family and friends, the people they interviewed were consistently shocked by the allegations against Jacob and

stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Original Fingerprint Condition**

Jacob Smith is a 6 foot, 2 inch, 28-year-old Caucasian male who is accused of murdering his wife, Sarah, who was a 26-year-old Caucasian female approximately 5 feet and 3 inches in height. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a computer technician, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours, friends, and family of the Smiths indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smiths' home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly. Upon searching the Smiths' house, the police noted signs of disarray in the garage, including several overturned paint cans, and a missing screwdriver. The police found the screwdriver near Sarah's body with fingerprints on it that were matched to Jacob's prints.

Jacob states that on August 22nd he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her

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gardening tools.  Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in detail to the police.  At 8:00pm, Jacob said that he heard Sarah leave and close the garage.  When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night.  Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah.  Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home.  At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation.  Jacob cooperated with the police and answered all questions promptly and concisely.  As police questioned Jacob's family and friends, the people they interviewed were consistently shocked by the allegations against Jacob and stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Fingerprint-Revised Condition**

Jacob Smith is a 6 foot, 2 inch, 28-year-old Caucasian male who is accused of murdering his wife, Sarah, who was a 26-year-old Caucasian female approximately 5 feet and 3 inches in height.  The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well.  Jacob works as a computer technician, where a typical day for him starts at 7:30am and ends at 4:30pm.  Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week.  Neighbours, friends, and family of the Smiths indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in

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the mountains together and taking vacations as much as possible.  However, recently neighbours observed that the Smiths have been fighting more frequently and loudly.  Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smiths' home.  The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22nd.  Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly.  Upon searching the Smiths' house, the police noted signs of disarray in the garage, including several overturned paint cans, and a missing screwdriver.  The police found the screwdriver near Sarah's body with fingerprints on it that were matched to Jacob's prints.

Jacob states that on August 22nd he came home from work, as usual, around 5:00pm.  Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools.  Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in detail to the police.  At 8:00pm, Jacob said that he heard Sarah leave and close the garage.  When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night.  Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah.  Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home.  At this point, Jacob finally called the police.

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According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. As police questioned Jacob's family and friends, the people they interviewed were consistently shocked by the allegations against Jacob and stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Shoeprint Analysis Condition**

Jacob Smith is a 6 foot, 2 inch, 28-year-old Caucasian male who is accused of murdering his wife, Sarah, who was a 26-year-old Caucasian female approximately 5 feet and 3 inches in height. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours, friends, and family of the Smiths indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smiths' home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly. Upon searching the Smiths' house, the police noted

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signs of disarray in the garage, including several overturned paint cans, and a missing screwdriver.

Jacob states that on August 22nd he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools. Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When the neighbours were questioned, none had recalled seeing Jacob leave the house that night. Police also found male shoeprints surrounding Sarah's body, which were consistent with Jacob's foot size and treads on a pair of boots he owned.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night. Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah. Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home. At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. As police questioned Jacob's family and friends, the people they interviewed were consistently shocked by the allegations against Jacob and stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Hair Microscopy Condition**

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Jacob Smith is a 6 foot, 2 inch, 28 year old male who is accused of murdering his wife, Sarah, who was approximately 5 feet and 3 inches tall.  The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well.  Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm.  Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week.  Neighbours, friends and family of the Smith's indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible.  However, recently neighbours observed that the Smiths have been fighting more frequently and loudly.  Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23$^{rd}$, 2011, in a forest near the Smith's home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22$^{nd}$.  Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly.  Upon searching the Smith's house, the police noted a large blood stain on the floor of the garage and a missing screwdriver.  Furthermore, police found several hair strands in Sarah's hand that were microscopically consistent with hairs taken from Jacob's head.

Jacob states that on August 22$^{nd}$ he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools.  Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in

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detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night. Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah. Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home. At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. As police questioned Jacob's family and friends, the people they interviewed were consistently shocked by the allegations against Jacob and stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Forensic Odontology Condition**

Jacob Smith is a 6 foot, 2 inch, 28 year old male who is accused of murdering his wife, Sarah, who was approximately 5 feet and 3 inches tall. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours, friends and family of the Smith's indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of Jacob told the police that

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lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23$^{rd}$, 2011, in a forest near the Smith's home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22$^{nd}$. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly. Upon searching the Smith's house, the police noted a large blood stain on the floor of the garage and a missing screwdriver. Police also found a bite mark on Sarah's arm consistent with Jacob's teeth impression suggesting a physical altercation between the two.

Jacob states that on August 22$^{nd}$ he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools. Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night. Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah. Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home. At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. As police questioned Jacob's family and friends,

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the people they interviewed were consistently shocked by the allegations against Jacob and stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Decomposition Odor Analysis Condition**

Jacob Smith is a 6 foot, 2 inch, 28 year old male who is accused of murdering his wife, Sarah, who was approximately 5 feet and 3 inches tall. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours, friends and family of the Smith's indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smith's home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly. Upon searching the Smith's house, the police noted a large blood stain on the floor of the garage and a missing screwdriver. The police discovered that the chemical composition of the air in the trunk of Jacob's car was consistent with gases expelled by a decomposing body.

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Jacob states that on August 22nd he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools. Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night. Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah. Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home. At this point, Jacob finally called the police.

According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. As police questioned Jacob's family and friends, the people they interviewed were consistently shocked by the allegations against Jacob and stated that he had always been a very outgoing, polite, and helpful individual with no previous violent tendencies.

**Criminal profiling Condition**

Jacob Smith is a 6 foot, 2 inch, 28 year old male who is accused of murdering his wife, Sarah, who was approximately 5 feet and 3 inches tall. The Smiths have lived in the quiet community in Kelowna, B.C. for six years and know their neighbours well. Jacob works as a carpenter, where a typical day for him starts at 7:30am and ends at 4:30pm. Sarah works the night shift from 11:00pm – 7:00am as a nurse at the local hospital five days a week. Neighbours,

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friends and family of the Smith's indicated that they have always appeared to be a happily married couple who frequently enjoyed long hikes in the mountains together and taking vacations as much as possible. However, recently neighbours observed that the Smiths have been fighting more frequently and loudly. Furthermore, friends of Jacob told the police that lately he had become increasingly jealous and suspicious of Sarah's whereabouts and was convinced that she was cheating on him.

Sarah was found dead at 7:45pm on August 23rd, 2011, in a forest near the Smith's home. The forensic pathologist estimated that Sarah was killed between the hours of 6:00pm – 8:00pm on August 22nd. Sarah had multiple stab wounds inflicted by a screwdriver in vital areas of her body, which had killed her almost instantly. Upon searching the Smith's house, the police noted a large blood stain on the floor of the garage and a missing screwdriver.

Jacob states that on August 22nd he came home from work, as usual, around 5:00pm. Sarah was gardening in the backyard and had left the garage open so she could easily access her gardening tools. Jacob then claims that he took a shower, made a sandwich for dinner and then watched television for the remainder of the night; he described the contents of the programs in detail to the police. At 8:00pm, Jacob said that he heard Sarah leave and close the garage. When the neighbours were questioned, none had recalled seeing Jacob leave the house that night.

Jacob claims that at midnight, he received a call from Sarah's work notifying him that she had not showed up for work that night. Jacob tried to call her cell phone various times, which was verified with phone records; however, he could not reach Sarah. Jacob did not become concerned over Sarah's disappearance until the next day after he arrived home from work and Sarah was still not at home. At this point, Jacob finally called the police.

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According to police officers, when Jacob was notified of his wife's murder, he appeared distraught as is typical of a person in this situation. Jacob cooperated with the police and answered all questions promptly and concisely. However, as police interviewed Jacob's friends and families, they discovered that Jacob's personality and family background were consistent with the offender profile created based on the crime scene and the position of Sarah's body.

**Appendix B**

**Juror Questionnaire**

Your Age _____

Your Ethnicity _____

Your Gender _____

1. Do you think the defendant in this case is guilty?

   1    2    3    4    5    6    7    8    9    10
   definitely                                     definitely
   no                                            yes

2. What verdict would you return in this case? (circle one)
   GUILTY      NOT GUILTY

3. If you said "Guilty" to item 2, how many years in prison should the defendant be sentenced to? _____ years

4. On a percentage scale from 0 – 100%, where 0% means that you are absolutely certain that the defendant is innocent and 100% means that you are absolutely certain that the defendant is guilty, how certain are you of the defendant's guilt? _____%

5. How strong do you think the defence's case was?

   1    2    3    4    5    6    7    8    9    10
   not very                                     very
   strong at all                                 strong

6. How strong do you think the prosecution's case was?

   1    2    3    4    5    6    7    8    9    10
   not very                                     very
   strong at all                                 strong

7. How important was the [insert evidence type] in helping you to reach your verdict decision?

   1    2    3    4    5    6    7    8    9    10
   very                                       very
   unimportant                                 important

`

8. How reliable did you find the [insert evidence type] in this case?

    1      2      3      4      5      6      7      8      9      10
    very                                                          very
    unreliable                                                    reliable

9. How reliable do you find [insert evidence type] generally?

    1      2      3      4      5      6      7      8      9      10
    very                                                          very
    unreliable                                                    reliable

`