

# **FORENSIC DNA EVIDENCE ON TRIAL**

**SCIENCE AND UNCERTAINTY  
IN THE COURTROOM**



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**Victoria Grace  
Gerald Midgley  
Johanna Veth  
Annabel Ahuriri-Driscoll**



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P U B L I C A T I O N S

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*Forensic DNA Evidence on Trial:*

*Science and Uncertainty in the Courtroom*

Written by: Victoria Grace, Gerald Midgley, Johanna Veth  
and Annabel Ahuriri-Driscoll

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# FORENSIC DNA EVIDENCE ON TRIAL: SCIENCE AND UNCERTAINTY IN THE COURTROOM

*A great deal of intelligence can be invested in ignorance  
when the need for illusion is deep.*

Saul Bellow<sup>1</sup>

**T**he social studies of science, or science and technology studies (STS), has systematically drawn attention to a process whereby distinct domains of technologically-embodied knowledge have been formulated, contested then socio-culturally consolidated through a process of black-boxing<sup>2</sup> and closure. Black-boxing typically occurs when the success of a new knowledge embodied in a technology leads paradoxically to the internal dynamics of the process being made invisible. All that is visible is what goes in and what comes out; if the result is that it is deemed to 'work', the processes involving interpretation and negotiation of its internal complexities become invisible as they are deemed matters of 'fact' (Cole, 2004; Dahl, 2010). This process has been discussed particularly in relation to the case of forensic

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1. This quotation is cited by Michael Saks (1997-8) by way of prelude to the conclusion of his analysis of the courts' evaluation of forensic identification science.

2. The notion of 'black-box' is a metaphor taken from the fields of computing and engineering to refer to a device that has known and identifiable input and output, but the internal workings are not known or visible. The 'black-box' metaphorically refers to this zone of inaccessible and therefore non-assessable, processing. Sociologist Anthony Giddens (1997) analyses how the phenomenon whereby members of an increasingly complex society are reliant on trusting 'experts' is problematically endemic to the conditions of modernity.

DNA technologies. It is argued that this ideological process of closure, whether gradual or relatively rapid, involves a complex network of diverse elements becoming aligned in such a way as to mean not only that the knowledge in its technological manifestation is treated as a 'given', but also that the socially- and politically-invested process enabling this status of acceptance and integration is effectively rendered invisible. This phenomenon, mapped and analyzed through STS over the last couple of decades, has raised a number of vexing questions, some of which go to the heart of the field's critical endeavour. Where do social analysts of this network stand? Is there a justifiable rationale for advocating alternative constructions of knowledge as science that reject foundationalism<sup>3</sup>, or does any such stance inevitably become an alter-foundationalism that undermines the very critique the field undertakes? These are the kinds of question that have been brought to the foreground in relation to forensic DNA evidence by Michael Lynch, Ruth McNally and Simon Cole among others<sup>4</sup>. We engage with these concerns and attempt to extend the debate through our research on understandings of DNA evidence in New Zealand. We analyse how the presentation of DNA evidence in the New Zealand courts is understood by criminal justice system (CJS) professionals and members of the lay public. Through this analysis, we are compelled to deconstruct the either/or of 'science' or 'common sense' and to argue for a view of 'science' that is antithetical to a social process

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3. We use the term 'foundationalism' to refer to knowledges that rest on some form of self-evident truth, or foundation, which is not in itself considered to be derivative.

4. In particular see Lynch and McNally (1999, 2003), and Lynch and Cole (2005).

of knowledge construction that could be ideologically foreclosed.

Members of the 'lay public' are potential jurors. They also form their own judgements on the safety or otherwise of convictions or acquittals in the courts of their communities, through exposure to media of various forms. The question of how members of a jury interpret highly technical and complex scientific presentations by expert witnesses is clearly one of considerable importance, and one that exercises the legal process as efforts to broaden reliance on the presentation of such forensic evidence intensifies. Our research team<sup>5</sup> became increasingly aware of concerns held by various professional groups within the New Zealand CJS, about the way members of the public (and hence jurors) interpret, think about and react to the presentation of DNA evidence; particularly the perceived divergence between 'lay public' and professional understandings. After a pilot study (MacDonald, 2005) confirmed the existence of a systematically articulated concern about such a discrepancy by members of professional groups, a full research project was developed. The first objective<sup>6</sup> of this research was to establish the

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5. Our research team comprises one university-based sociologist/psychosocial researcher and three social science researchers within the Crown Research Institute for Environmental Science and Research (ESR), one of whom (GM) has subsequently moved to a university position in systems thinking; one team member (JV) is also a forensic scientist with ESR. ESR conducts all forensic testing in New Zealand under contract for the Police, holds the national DNA database, and is available to conduct forensic evidence testing for the defence in a case, if requested (and paid).

6. Additional objectives were to examine how different meanings and interpretations of DNA as evidence might reinforce or marginalize identifiable paradigms of justice, and to explore how forensic DNA

nature and implications of any such difference through analyzing the meanings of DNA evidence.

The expert witness for the prosecution in New Zealand formulates the presentation of DNA evidence to the court as a likelihood ratio (LR), which is a probabilistic likelihood derived from the application of a Bayesian statistical analysis (detailed further below). This presentation is different from the random match probability (RMP) used in the courts in the United States. Interpretations of the LR statement as it is read in court are the focus of our analysis of convergences and divergences of understandings of DNA evidence by members of the lay public and CJS professional groups. Firstly we situate our analysis within relevant debates identified within the social studies of science literature that pertains specifically to forensic DNA technologies; we then review the key issues in selected papers on interpretations of the LR and the RMP; the methodology of our research is outlined; and the main themes that emerged from our analysis are discussed. The points of divergence between the professional groups and members of the lay public do not fall neatly down a line between these groups. Problems with interpretation of the LR relating to the meaning of the statistics are evident across all groups. While outlining these problems we focus on the meanings of the large 'numbers' (or small probabilities) that typically characterize the LR in the talk of participants; the substitution of probabilistic terms with reductionist beliefs; the problematic consequences of associating 'science' with 'certainty'; limits

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technologies are reinforcing or reshaping symbolic rituals of the CJS that in turn reflect and support dominant conceptions of justice. Māori perspectives were to be examined across these objectives. Māori are the tangata whenua or indigenous people of Aotearoa, or New Zealand.

to understanding and concerns with 'confusion'; and the ensuing implications for the use of the LR statement as currently presented in the courts. Through this analysis we interrogate the way 'science' is discursively constituted by participants across both groups, and argue that this discursive formation of knowledge is counter to what the term 'science' could most usefully mean, not only within the criminal court, but also from the point of view of critical social studies of science.

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## APPENDIX

<b>Participant</b>	<b>Role</b>
<b>Interview 01</b>	Forensic Scientist—Crime Scene Specialist
<b>Interview 03</b>	Forensic Scientist—Crime Scene Specialist
<b>Interview 04</b>	Police—SOCO
<b>Interview 05</b>	Police—SOCO
<b>Interview 06</b>	Police—Detective
<b>Interview 07</b>	Police—Detective
<b>Interview 08</b>	Forensic Medical Practitioner
<b>Interview 09</b>	Forensic Scientist—DNA
<b>Interview 10</b>	Police—SOCO
<b>Interview 11</b>	Police—Detective
<b>Interview 12</b>	Police—Detective
<b>Interview 13</b>	Police—Detective
<b>Interview 14</b>	Forensic Medical Practitioner
<b>Interview 15</b>	Forensic Scientist—DNA
<b>Interview 16</b>	Forensic Scientist—Crime Scene Specialist
<b>Interview 17</b>	Forensic Scientist—Crime Scene Specialist
<b>Interview 18</b>	Forensic Medical Practitioner
<b>Interview 20</b>	Forensic Scientist—DNA
<b>Interview 21</b>	Forensic Scientist—Crime Scene Specialist
<b>Interview 22</b>	Forensic Medical Practitioner
<b>Interview 23</b>	Police Management
<b>Interview 24</b>	Defence Lawyer
<b>Interview 25</b>	Police—Detective
<b>Interview 26</b>	Scientist—Defence Analyst
<b>Interview 27</b>	Prosecutor
<b>Interview 28</b>	Prosecutor
<b>Interview 29</b>	Prosecutor
<b>Interview 30</b>	Defence lawyer

**Table 1** *Interview Participants' Interview Number And Role.*

Role	Total (n)	Gender		Experience		
		Males (n)	Females (n)	Less than 5 years	Between 5 & 20 years	More than 20 years
Defence Lawyers	2	2				2
Forensic Medical Practitioners	4	2	2		2	2
Forensic Scientists—Crime Scene Specialists	6	1	5	1	3	2
Forensic Scientists—DNA	3		3		2	1
Forensic Scientists—Defence analysts	1	1				1
Police—Detectives	6	6		1		5
Police—SOCO	3	1	2	1	1	1
Prosecutors	3	2	1	1	1	1

**Table 2** Interview Participants' Role, Gender And Length Of Experience

<b>Group</b>	<b>Number in Group</b>	<b>Females</b>	<b>Males</b>	<b>Location</b>	<b>Duration (minutes)</b>	<b>Facilitator</b>	<b>Notes</b>
<b>Māori M1</b>	10	7	3	Ōrākei Marae	94	AAD & JV	Extended Family Group, wide age range.
<b>Pacific Island P1</b>	8	7	1	Unitec Institute of Technology	126	GM & JV	Staff from the Centre of Pacific Development And Support. Participants are from various Pacific Islands.
<b>European NZ E1</b>	8	5	3	Private Residence	96	JV	A group of people known to each other, wide age range. Most are Caucasian, 1 Māori, 1 Pacific Island.
<b>European NZ E2</b>	9	7	3	Avondale Returned Services Association	78	AAD & JV	A group of senior citizens
<b>Māori M2</b>	6	5	1	ESR	118	AAD & JV	A group of people known to each other, organized by a friend of AAD.
<b>Chinese C</b>	8	5	3	ESR	102	VG & JV	A group of immigrants, wide age range.
<b>Pacific Island P2</b>	5	3	2	Avondale Union Church	112	GM & JV	A Pacific Island group connected through a local church, wide age range.

**Table 3** Focus Groups Summary

