APPEAL COURT, HIGH COURT OF JUSTICIARY

[2024] HCJAC 52
HCA/2024/489/XC

Lord Justice Clerk
Lord Matthews
Lord Beckett

OPINION OF THE COURT

delivered by LADY DORRIAN, the LORD JUSTICE CLERK

in

Appeal under section 74(1) of the Criminal Procedure (Scotland) Act 1995

by

DIONNE CHRISTIE

Appellant

against

HIS MAJESTY'S ADVOCATE

Respondent

Appellant: Duguid KC, McMillan; Paterson Bell, Solicitors (for John Kilcoyne & Co, Glasgow)
Respondent: Jessop KC AD; the Crown Agent

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15 November 2024

Introduction

[1] The appellant is indicted for trial at the High Court of Justiciary at Stirling, charged with, *inter alia,* the murder of her partner. She lodged a preliminary issue minute objecting to the admissibility of a report prepared by an ergonomist which purports to include

computer simulations of the event using biomechanics. Following an evidential Preliminary Hearing the temporary judge refused the minute. The appellant now appeals to this court in terms of section 74(1) of the 1995 Act against that decision.

Background

[2] The deceased died of a stab wound through the heart on 26 June 2022 at an address in Falkirk. The deceased and the appellant were alone at the address together when the death occurred. The appellant was pregnant with the deceased's child. The appellant provided two statements to police in which, to paraphrase, her account was broadly to the effect that that the deceased had tightly wrapped his arms around her from behind during a struggle, held a knife to her stomach, and threatened to "cut the baby out of [her]." His arms were crossed in front of her, the knife in one hand and the sheath in the other. She did not know which hand the knife was in. She managed to free herself from the deceased's hold and in the moments after this she saw blood coming from the deceased's body. The first statement was made shortly after the incident, the second one three days later. The critical parts of the statements are as follows:

Statement 1:

> **"**I then walked out of the bedroom to either the lounge or the kitchen, then I returned to the bedroom Jevin was stood in the doorway and grabbed me from behind, wrapping his arms around me. He was holding his knife in one hand and the case in the other. I can't think which was in what hand, this was due to his hands crossing over in front of me. Then I remember seeking the tip of the blade being close to my stomach, so I moved a bit and bent forward to avoid it from touching me shouting 'ARGH.' I felt like I was trapped as I had to struggle really hard to move, where the more I did the harder he squeezed me, but somehow managed to move my body or knock him with my bum where I was more to his right side with him still stood behind me facing the same way.
>
> Jevin then released his grip on me, I don't know if it was me shouting 'ARGH', I wasn't sure why by the wasn't holding me anymore and he walked from bedroom to living room, it was at that point that I saw him lift up his top to the middle of his

> chest with the hand that wasn't holding the knife. I saw that there was blood all over his stomach area."

Statement 2:

> "… I felt him grabbing me, my back was against his front, he had a tight hold of me, he had his arms crossed in front of me, he had the knife in one hand and the cover in the other. [The deceased] had the knife in one hand, I don't know which hand because his hands were crossed over, I don't know how he was holding the knife, he could have had it with his hand underneath the handle with his knuckles towards the floor or his hand above the handle with is (*sic*) knuckles towards the ceiling. The knife was pointing towards my stomach, above the waistband of my shorts, I don't remember the knife touching my skin, I only had a pair of shorts on and a pink and black bra. He was saying he was going to cut the baby out of me. I was struggling to get away from him, he was tightly holding me, I was fighting to get him off of me, by pushing my bum back as hard as I could, I think my bum hit his hip bone, more to his right side, I could see him over my left shoulder, he wasn't directly behind me at this point, he still had a hold of me. I said 'AGHH' and (*sic*) said 'AGH', he loosened his grip and I've managed to get away from him".

The statement continued:

> "[the deceased] walked out of the bedroom, walked right along the hallway and into the living room, I've walked behind him to see what was wrong he's, he's (sic) turned round he was standing in the living room in front of the TV, he still had the knife and case in his hands, he's pulled his top up and I just saw all the blood going down his belly, he said 'phone your mum…'"

In neither statement does the appellant offer an explanation of how the knife entered the deceased's sternum, stating that she had not realised he had sustained injury until they had moved apart.

The Expert Report

[3] Police Scotland instructed Dr David Usher, Consultant Ergonomist, to prepare a report on the biomechanics of the account given by the appellant of the incident. The analysis within his report was informed by:

> "…*inter alia,* the following disclosures:
>
> - Two statements by [the appellant]

- A statement by a friend of [the appellant]
- The post-mortem report
- An analysis of the sharpness of the knife
- Photographs of the crime scene."

Notwithstanding Dr Usher's use of the term "*inter alia,*" the only other information referred to is a demonstration given by the appellant to the police of the parties' respective positions during the incident.

[4] It is clear from the report that the narrative of the incident relied upon by the witness is that contained in the first paragraph of the excerpt from the second statement given by the appellant, as noted at para [2] above. He also noted that:

> "During the investigation, [the appellant] demonstrated her movements to the Police, and it became clear that by 'get away from him' she meant escaping under the deceased's right arm and past his right side. It is this scenario that has been analysed…"

[5] Dr Usher created what he described as a computer simulation of the appellant's account of the incident. That simulation is said to follow the laws of physics and biomechanics together with the "principles of animation and human motion", and was run many thousand times using many different variables, - such as the speed at which the knife might have entered the deceased's body, the path along which the knife might have travelled and the magnitude of energy contained in the knife's movement under those conditions

[6] Dr Usher concluded that:

> … the probability that Ms Christie's account can be supported by the biomechanical evidence is much less than 0.25%."

The evidence

[7] The witness gave evidence at the PH, during which he elaborated on his expertise,

the method used, the assumptions involved, and sundry other matters some of which are discussed below. Senior Counsel for the appellant produced a copy of the notes taken by his junior during the PH, and the Advocate depute helpfully acknowledged that these were sufficiently accurate for the purpose of the appeal. We refer to sections of that evidence below.

Submissions for the Appellant

[8] Senior Counsel for the appellant made four submissions:

(i) The expert evidence, in advancing what purports to be a statistical assessment of the probability of the appellant's account being credible usurped the function of the jury in determining credibility and reliability. The varied dynamics of a fight or struggle are comfortably within the knowledge of an ordinary juror, which is not a meet subject for expert evidence (*Gage* v *HM Advocate* 2012 SCCR 161). A juror's judgement on the varied dynamics of a physical altercation is a matter of life experience (*Snowden* v *HM Advocate* 2014 SCCR 663at para 67; *R I Turner* 1975 QB 834 at pp841).

(ii) That the modelling was based on hearsay evidence and assumptions: there was no sound factual basis underpinning the report. Dr Usher himself reported that "considerable approximation is inevitable." Dr Usher had selected a version of events from witness statements taken by the accused before she was considered to be a suspect. He had supported this statement with a hearsay description of her re-enacting the fatal event to a police officer without ever having seen or heard from the appellant herself.

(iii) The evidence was collateral to the issues in dispute, and would detract from the key issue at trial. The statistical assessment of the likelihood of an accused's version of events being untruthful would set the law on a course hitherto unrecognised, namely the

percentage assessment of what constitutes reasonable doubt. The analogy drawn by the PH judge with the reconstruction of a road traffic accident was not an equal comparison.

(iv) That Dr Usher does not meet the criteria of an expert witness. Ergonomics has been, to this point, traditionally concerned with the understanding of the interactions among human and other elements of a system, in order to optimise wellbeing, remove risk of injury and improve overall system performance in working environments. This would cover physical, environmental and psychological aspects of work and its organisation. Its application to health and safety at work is recognised. Its application to the dynamics of a physical altercation in the context of serious crime is unprecedented.

Submissions for the Crown

[9] The Advocate depute in his oral submissions recognised that there were severe difficulties with the admissibility of the evidence. The written submissions for the Crown had noted:

(i) That the Crown required to rebut the account of the appellant that the deceased accidentally inflicted the fatal wound upon himself. The evidence of Dr Usher as an expert in biomechanics and ergonomics would assist the jury in relation to a subject matter outwith their knowledge and experience.

(ii) That the jury would not be able to draw the inferences from the primary evidence which Dr Usher, with his extensive training and experience, could draw (*Mitchell* v *HM Advocate* 2018 JC 67). Whilst credibility and reliability of a witness's evidence was for the jury to decide, it is common for an account, given by an accused person to police, to be put to a skilled witness for comment. Dr Usher's proposed evidence provides comment,

based on specific training and experience, on the likelihood that an account given by the appellant could explain the cause of the stab wound to the deceased's chest.

(iii) That an expert witness cannot usurp the function of the jury. However, in order to avoid elusive language, the skilled witness may have to express his or her views in a way that addresses the ultimate issue before the court (*Kennedy* v *Cordia Services LLP* at para 49). Dr Usher explained why he proceeded in the way that he did, what steps he took, what assumptions he made and the method used to reach his conclusions. He explained why the conclusions are expressed in the way that they are. He was clear about the limitations to his evidence but also that he felt able to express the opinion that he did and why that is so. The judge heard parole evidence from Dr Usher in relation to these matters and correctly concluded that that evidence was admissible.

(iv) That Dr Usher's experience was based on a recognised and well-developed academic discipline. The PH judge was correct to decide that Dr Usher was a suitable expert. Skilled witnesses are often asked for their views on various competing scenarios. The fact that the basis for those scenarios may be in evidence which might be hearsay does not render the evidence inadmissible. The appellant would be entitled to advance her criticisms of Dr Usher's evidence in cross-examination or by leading evidence from another similarly qualified expert.

Analysis and Discussion

Scope of expertise

[11] The expert witness states in his report that he was instructed

> "to prepare a report on the biomechanics of the account given by [the appellant] of the incident that resulted in the death of [the deceased] by stab wound. The intention is to establish the extent to which [her] account can be substantiated from a biomechanical perspective."

[12] The witness is a consultant ergonomist and his expertise in that field appears established. Less apparent is his expertise in biomechanics ("the study of the function of the human body using the methods of mechanics, and anthropometry, the measurement of human parameters and their variability") and the extent to which that discipline may be considered a subset of ergonomics ("the application of scientific information concerning humans to the design of objects, system and environment for human use" - both definitions taken from the report, for convenience), as asserted in the report, and whether there are any limitations or restrictions on the extent to which the two may be considered to overlap. This issue was not adequately explored during the evidence of the witness, either by the parties or by the judge. There are also unresolved issues about the extent to which the witness is qualified to offer evidence on probability or statistics which was wholly unexplored during the course of his evidence. Had we been prepared to consider the evidence in general as admissible, these are matters which would have had to be addressed further, both in terms of evidence and submission, but we do not require to reject the evidence on such a potentially technical basis, since we are satisfied that the evidence is not admissible for fundamental reasons noted below.

Admissibility of the appellant's statements

[13] The appellant made two statements to the police. The first was given during the evening of the incident. She was not cautioned, but that may not matter. It is reasonable to assume that the police were conducting initial inquiries at that stage and were questioning her with a view to obtaining general information about the circumstances – *Chalmers* v *HMA* 1954 SLT 177. However, by the time of the second statement three days later, it was clear that on the appellant's account she was the only person present with the deceased at the

time of his death and had been involved in a struggle with him, during which he was wielding a knife, immediately prior to his sustaining fatal injury. The absence of a caution at that stage is a little more surprising. As can be seen from the excerpts quoted above, the accounts given are substantially the same, although they vary in some details. For example the second statement refers to the deceased coming towards her from her left side, before grabbing her, whereas in the first statement she states he grabbed her from behind; the second statement appears to have the deceased making an exclamation "aagh" just prior to releasing the appellant whereas this is not part of the first statement; there are also material differences in the explanation of how she managed to get away: in the first statement she "had to struggle really hard to move …. somehow managed to move her body or knock him with her bum", in the second, she "was fighting to get him off, by pushing my bum as hard as I could". The matter is relevant since the expert witness proceeded on the content of the second, potentially inadmissible statement, rather than the first. The defence does not challenge the second statement, and may indeed wish it to be led, so the question of admissibility is somewhat academic. It is noteworthy that, despite being provided with the two statements made by the appellant, he proceeded only on an account given in the second, quoted above. Thus he was not aware of the differences we have highlighted which might have a bearing on the relative position of the parties, their movements, the forces involved and so on.

Is there an underlying basis for the expert's conclusions?

[14] It is important to note that in neither statement does the appellant give an account of how the weapon came to penetrate the chest of the deceased. In each statement she refers to managing to free herself from his grasp and only thereafter noticing the blood coming from

his chest. She gave no account of how the injury had been caused. Her account was limited to providing details of the struggle, and it is from this that the expert sought to extrapolate conclusions as to the energy which might have been transferred to the moving arm of the deceased and so inflicted the wound, which in turn he used to assess the probability of the appellant's account of events. The witness stated in his evidence that he factored in a range of variations of speed and movement of the knife as it approached the body within the range of human possibility, but there are many difficulties with the approach he took.

[15] As we have noted the witness relied only on one of two statements made by the appellant, thus leaving out of account the differences we have highlighted in the paragraph [13]. He considered these irrelevant because his concern was only with what happened after the appellant extricated herself from the grasp of the deceased. The expert was aware of the height (about 6ft 1") of the deceased, his build (slim) but does not mention any awareness of his strength, muscle development, or whether he worked out. He had no information about the height or build of the appellant (5ft 8", 8 stone), and considered this equally irrelevant for the same reasons, namely that his simulation was "of events post release". The logic of this approach is impossible to understand. The witness in his evidence stated that

> "There was force being used to restrain her. She then escaped the force that was being used to restrain her then becomes the force that accelerates that knife and the arm system, and the knife then approaches the chest of the deceased. The force that he exerted on her, suddenly becomes the force that stabbed him."

Thus the degree of force used, or indeed which might be required, to restrain her is central to the issue of that force subsequently being transferred to the arm and potentially leading to the penetration of the body by the knife. The respective heights, build, strength and so on of the parties is clearly an important factor in the creation of these forces, as is the degree of

force used or required by the deceased to subdue the appellant, but they were left entirely out of account. The witness treated those involved as equal in these respects, which we know they were not. Indeed, he accepted that these factors would be relevant "in the dynamic of the struggle". The point was crystallised in a question from senior counsel to the effect that the force used by the deceased indicated the possible speed in his arm, not reflected in the simulation. This resulted in the answer:

> "The greater the force, the faster his arm would move when it is released instantly. The greater force would increase speed."

On his own evidence therefore he has ignored a relevant factor.

[16] The report continues that:

> "During the investigation [the appellant] demonstrated her movements to the police, and it became clear that by 'get away from him' she meant escaping under the deceased's right arm and past his right side. It is this scenario that has been analysed below."

The witness was not present during that demonstration, the source of his information about it is not explained, nor is the detail provided to him specified. In his evidence he merely said it was verbally reported to him by a police officer. Further, beyond this bald narrative he does not explain what conclusions he drew from this, about, for example, the height of the deceased's arm, the position of the appellant, or indeed the relative positions of the parties.

[17] Using his own interpretation of this unverified scenario, the witness ran computer simulations of the incident, in respect of which he states:

> "Underlying the model is the idea that the deceased was using **considerable force** to restrain [the appellant] and when she escaped, the force was **suddenly** released, **causing his arm to accelerate uncontrollably.** His hand then **traversed a curved path** towards his body until the tip of the knife met his chest, whereupon the kinetic energy in the motion was dissipated in cutting the flesh."(emphasis added)

The problem with this is that it is all highly speculative. There are far too many unknown factors to enable any reasonable conclusions to be drawn. The force used, or which would have been required to restrain the appellant is not known. The assumption that the force was "suddenly released" is just that, an assumption. In evidence the witness stated

> "The way the model works is to assume that she escapes almost instantaneously, which is a generalist assumption. He would have tried to restrain her and adopted a different posture but that posture might not cause him to stab himself."

[18] It is not known whether the force applied was constant during the period when the appellant was held, or whether it diminished approaching the time of release; although it appears that the witness proceeded on an assumption that it was a constant force suddenly released when the appellant extricated herself. The path of the knife from the deceased's hand to his chest, whether straight, curved or deviating is unknown. In his evidence the witness stated:

> "There are a huge range of trajectories the hands might have taken. We know where it ended up but we don't know where is started from."

There is no information confirming which hand the knife was held in and it is understood that the deceased was ambidextrous. In his report the witness records this understanding. Nevertheless, the simulations throughout had the knife in the right hand and the sheath in the left, "which appears most likely". What makes it more likely than the other way round is unexplained. The witness stated that he "believes" that the result would be very similar if the simulation had been run the other way round, but there is no way of testing that assertion. The witness has made the unwarranted assumption that the knife was in the right hand, and factored that into his simulation, which in evidence he said was: "based on her account that she goes in the same direction as he is holding the knife." Neither account from

the complainer contained any such assertions. The actual relative position of the parties is not known. In evidence the witness stated:

> "We don't know how he was holding her, we don't know where he was holding her, there is uncertainty about how the movement starts."

[19] In short, there is no reliable, clear, specific, or indisputable information about the relative position of the parties, the path of the knife, the angle, speed or direction of approach of the knife, the degree of force, how the knife was held or even which hand it was in. There is simply no underlying accepted or established factual basis which would enable any computer simulation to have any evidential value at all.

[20] The witness does recognise, to an extent, these deficiencies, noting that the "path and duration of the movement can be known only approximately" (elsewhere he notes that "stabbing attacks are notoriously difficult to analyse precisely). Thus he proposed to address his task by considering a "large range of possible energies". Factors which constituted uncertain variables included those such as speed of movement, the path of the arm, and the time taken for any trajectory. In his evidence the witness stated:

> "It is a very approximate process. We don't know where the arm is starting off, we don't know the force being applied … it is an approximate model."

[21] The result is entirely speculative and theoretical, and standing the wholly uncertain basis of fact, no reliance can be placed on it. The temporary judge sought to draw an analogy with reconstruction evidence in a road traffic evidence, but in such a case the reconstruction is based to a large extent on objectively verifiable measurements, such as the location, length and direction of skid marks, the ultimate position of the body, the nature, degree and location of injury on the body, pedestrian projection distance, the damage to the vehicle, the shape and mass of the vehicle and so on. The role of the expert is to assess these factors against known, accepted and well-researched norms to offer evidence about the

nature of the collision, but the critical point is that much of the underlying factual basis is objectively verifiable. The analogy is thus a false one, the present case being one where such an underlying, objectively verifiable state of facts is entirely absent.

[22] The temporary judge relied on *Kennedy* v *Cordia Services LLP* 2016 UKSC 6, which is of course a civil case. In *Kennedy*, the Supreme Court noticed the requirement of necessity in Scots law of evidence in criminal cases. They were at pains to point out that this was not within their jurisdiction; para 37. There is a well-established line of criminal jurisprudence as to the role of an expert witness, especially in the context of a jury trial, and these should be the first port of call when considering such an issue. In this case the judge concluded that there was a reliable body of knowledge or experience underlying the expert's evidence, under reference to biomechanics as a recognised discipline. However, in doing so, he failed entirely to address the equally important question whether the evidence had a sufficiently satisfactory factual basis and whether the application of biomechanics to the circumstances in question was an appropriate utilisation of the discipline. In doing so he misdirected himself and wrongly considered the evidence to be admissible.

[23] The Crown seek to prove that the death arose from a deliberate attack by the appellant. That is clearly one possibility, and there is evidence of a statement from a friend of the appellant which appears to contain an admission by her to a deliberate act. The jury would have to determine whether they were satisfied beyond reasonable doubt that this had happened. In doing so, they would be entitled to consider the whole circumstances, which would include the internal track of the injury, the organs or body parts through which it passed, the depth of the wound, whatever is known about the sharpness or otherwise of the knife, the relative size and strength of the individuals, and their view of the likelihood or otherwise of an accidental injury, having regard to the appellant's account. The post-

mortem report, production 10, suggests that the jury will hear opinion evidence to the effect that the knife:

> "… pierced the sternum and the cartilaginous part of one of the ribs before entering the chest, thereafter piercing the pericardium and ending in the right ventricle of the heart."

and

> "Numerous factors, many of which could not be assessed at autopsy, influence in general terms the degree of force required to inflict such a wound. That said, as a general guide and in view of the injury of the sternum and rib, it would be expected that at least a moderate degree of force would have been required to cause such an injury."

The appellant offers no real explanation for the mechanism of injury other than that, in the moments immediately prior to her realising the deceased was injured, she had been restrained by the deceased and she had been able to free herself.

[24] The jury would only require assistance with the task facing them should the subject matter fall outwith ordinary knowledge or experience. The appellant's account is not particularly complicated or sophisticated. Her anticipated evidence is that of a human interaction between two people. It is well within the competence of an ordinary juror to assess the evidence and reach a verdict without requiring evidence of the kind offered by Dr Usher. In essence, the anticipated expert evidence usurps the function of the jury, by placing a probability on the stated account of the appellant. The witness essentially accepted this, in cross examination when it was put to him that his conclusion reflected his assessment of the statistical probability of whether the appellant was telling the truth or not. A similar point was made in re-examination following a leading question from the Advocate depute.

[25] Apart from the absence of any reliable underlying basis for it, since the evidence is not necessary for the jury's task, it is not admissible; *Gage* v *HM Advocate* 2012 SCCR 161 per

LJG Gill at para 22, citing *Wilson* v *HM Advocate* 2009 JC 336 at para 58, Dickson *A Treatise on the Law of Evidence in Scotland* (3rd Hamilton Grierson ed, 1887), vol 1, at para 397.

[26] A further difficulty arises in the way the conclusion is expressed, namely that the probability that the appellant's account can be supported by the biomechanical evidence is much less than 1/400 or 0.25%. It is difficult to know what the jury are meant to make of this. Apparently the witness ran about 10,000 simulations using the huge range of variables to which he referred. How the probability stated in the conclusion interacts with these many simulations is not explained. Rather than simplifying matters and assisting the jury with their task, the introduction of calculations of statistical probability (leaving aside the fragile and uncertain hypotheses on which they are based) would risk greatly complicating and confusing the jury's task. Probability is a notoriously difficult area. "The Use of Statics in Legal Proceedings", published jointly by the Royal Society of Edinburgh and the Royal Society notes, p 25, that "Communication of probability is fraught with the potential for misunderstanding". The witness is not a statistician, nor he he an expert in probability. The way in which the conclusions are expressed raises the spectre that even further expert evidence might be required, and indeed the written submissions for the Crown do seem to envisage this necessity. This would inevitably take the focus of the case ever further from the simple question at its centre.

[27] The report contains numerous scientific formulae which are not explained in any helpful way, and which were not explored in evidence. These would require to be tested by an appropriately qualified individual, and in all likelihood challenged. For example, at p 8 of the report the witness appears to use a measurement for the length from the back of the elbow to grip for a British man of the 92nd %ile stature as 713mm, or .713 m, in other words 71cm. This seems highly improbable. The actual length of the deceased's arm from elbow

to thumb was 37cm and from elbow to the tip of the fingertips was 47cm. The figure stated in the report is not a mere mistake or misprint, because it is quite clear that it was this figure which was actually used in the formulae as calculated. This was not explored in evidence at the PH but it raises the prospect that the whole of the report is undermined by a mistaken measurement.

[28] For all these reasons we are satisfied that the appeal must succeed and the evidence be ruled inadmissible.