Chapter 2

Sports science in Australia: definitional and practical concerns

Innovation in sport is expected by the public, by the sponsors and by the participants. The challenge for sports medicine and sports science is to have that fine line between what is physiological and safe, and not what the cowboys are doing that might be harmful and have long-term effects.[1]

Introduction

2.1 This chapter discusses the diverse nature of the sports science profession and the challenges associated with defining it. It draws attention to the collaborative role that sports scientists typically play within sporting clubs and organisations, often focusing on incremental gains in athletes' performance through cutting-edge technologies and practices. The chapter concludes by referring to widespread criticism of the role of sports scientists in Australia.

What is sports science?

2.2 There is no accepted definition of sports science in Australia. Some definitions make reference to the role of the profession in terms of sports performance, while others make broader reference to helping athletes.

2.3 Exercise & Sports Science Australia (ESSA) defines sports science as:

> … the study and application of scientific principles and techniques with the aim of understanding, and providing information that can be used to improve sports performance.[2]

2.4 Dr Nick Brown, the Deputy Director of Performance Science and Innovation at the Australian Institute of Sport (AIS), described the practice simply as 'the use of science to help athletes'.[3]

2.5 The Australasian College of Sports Physicians (ACSP) submitted that medical scientists, allied health practitioners and medical practitioners can also be considered sports scientists 'or at the very least acting in part as sports scientists', depending on

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1 Dr Peter Larkins, *Proof Committee Hansard,* 12 June 2013, p. 75.

2 Exercise & Sports Science Australia, *Submission 7*, p. 2.

3 Dr Nick Brown, Deputy Director, Performance Science and Innovation, Australian Institute of Sport, Australian Sports Commission, *Proof Committee Hansard,* 12 June 2013, p. 8.

the role they perform in sporting organisations.[4] However, it is important to note that the Australian Sporting Commission (ASC)[5] distinguishes between sports science and sports medicine.[6]

2.6 'True sports scientists', the Department of Regional Australia, Local Government and Sport (DRALGAS) submitted, 'are a small, highly qualified set of individuals, with significant levels of academic and practical experience'.[7] However, the Australian Sports Commission (ASC) submitted that the title sports scientist is 'being adopted by individuals who are not sufficiently qualified and whose practices are not scientific'.[8]

2.7 Mr Daniel Greenwood—a Queensland-based sports scientist—submitted that the absence of a precise definition has 'allowed a variety of "pseudo-science" practitioners to operate under the same classification as highly qualified and experienced specialists'.[9] In effect, the Australian Athletes' Alliance (AAA) submitted, currently 'anyone' can call themselves a sports scientist.[10]

A diverse practice

2.8 The lack of an official or widely accepted definition of sports science has led to several conceptions covering a diverse set of practices. The term has been used in media reporting to describe a range of activities within Australian sport and sporting clubs. Professor Damian Farrow, Professor of Sports Science at the AIS, believes that the lack of awareness about the number of differently skilled sports scientists has therefore led to some being 'tarred with the same brush' as others who have come under recent scrutiny.[11] He said that while many professionals answer to the 'generic' term 'sports scientist':

> … we are a group of diverse specialists that have developed specific knowledge and skill in one area of science. If we consider the team of

4 Australasian College of Sports Physicians, *Submission 10*, p. 2.

5 The ASC is the Australian Government body responsible for the Government's funding to Australia's national sporting organisations. It aims to develop sporting excellence and increase participation in sport.

6 See Australian Sports Commission, *Annual Report 2011–2012*, 2012, p. 10.

7 Department of Regional Australia, Local Government, Arts and Sport, *Submission 11*, p. 3.

8 Australian Sports Commission, *Submission 17*, p. 2.

9 Mr Daniel Greenwood, *Submission 19*, p. 1.

10 Australian Athletes' Alliance, *Submission 18*, p. 1.

11 Professor Damian Farrow, 'Tarred with the same brush: what do sports scientists do?', *Conversation*, 11 February 2013.

> sports scientists within a high-performance sport setting, such as the [AIS] or an AFL club, the diversity of expertise is a defining feature.[12]

2.9 Echoing this view, Mr Richard Eccles, the Deputy Secretary of DRALGAS, described the practice as a 'broad church'.[13] DRALGAS critiqued ESSA's definition of an 'accredited sports scientist' as:

> … likely to be too broad to adequately differentiate the level of skills and therefore appropriate level of accreditation for the high performing sports scientists employed within the institutes and academies of sport in Australia, and some major sporting organisations.[14]

2.10 Professor Farrow referred to specialists in:

- nutrition—who assist athletes to maximise their food and hydration strategies to enhance training and performance;
- physiology—experts in the conditioning or fitness development of athletes;
- recovery—who have introduced concepts such as ice baths, compression techniques and better sleeping habits to high-performance athletes;
- movement—experts in biomechanics, who measure the technical skill of athletes;
- skill-acquisition—who work closely with coaches to provide evidence-based advice about the most effective methods to practice and develop the key skills of a game; and
- performance—who collect and analyse the metrics that define a game, relied on to provide objective statistics on the speed of the game.[15]

2.11 The Coalition of Major Professional and Participation Sports (COMPPS)—which represents seven organisations that are governing bodies and custodians of major professional sports in Australia—similarly submitted that 'the term "sports scientist" is generic and that a sports science team may consist of a group of diverse sports science specialists that have developed specific knowledge and skill in one area of sports science'.[16] COMPPS referred to discipline-specific sports scientists,

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12 Professor Damian Farrow, 'Tarred with the same brush: what do sports scientists do?', *Conversation*, 11 February 2013.

13 Mr Richard Eccles, Deputy Secretary, Department of Regional Australia, Local Government, Arts and Sport, *Proof Committee Hansard*, 12 June 2013, p. 2.

14 Department of Regional Australia, Local Government, Arts and Sport, *Submission 11*, p. 4.

15 Professor Damian Farrow, 'Tarred with the same brush: what do sports scientists do?', *Conversation*, 11 February 2013.

16 Coalition of Major Professional and Participation Sports, *Submission 9*, p. 5.

including 'sports physiologists, recovery specialists, sports psychologists, biomechanists, skill acquisition specialists and performance analysts'.[17]

2.12 The Australian Olympic Committee (AOC) noted that:

> The lack of an overarching regulatory framework, or even a common set of minimum qualifications and standards which are specific to sports and athletic performance, means that the role of a 'sports scientist' is left to individual sporting organisations and institutions to determine. The role of a sports scientist in one sport may be entirely different to the role of a sports scientist in another.[18]

2.13 One submitter, Mr Andrew Mac Donald, criticised the inquiry's terms of reference for failing to define 'sports scientists', arguing that the term applies to an 'unmanageably enormous variety of conduct'.[19]

The tension between performance and health

2.14 The definition of sports science provided by COMPPS in its submission to the inquiry highlights the emphasis that is placed on performance:

> Sport Science is the study and application of scientific principles and techniques with the aim of understanding, and providing information that can be used to improve performance.[20]

2.15 The National Institute Network (NIN) described the practice in similar terms.[21]

2.16 Dr Jason Mazanov, Senior Lecturer at the University of New South Wales, Canberra, believes sports science 'has strayed too far towards valuing performance at the expense of athlete health and welfare'.[22] In his view:

> This is reflected at every level of sport … from country town heroes playing while injured to the pursuit of Olympic medals at the expense of mental health.[23]

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17 Coalition of Major Professional and Participation Sports, *Submission 9*, p. 5.

18 Australian Olympic Committee, *Submission 12*, p. 1.

19 Mr Andrew Mac Donald, *Submission 2*, p. 2.

20 Coalition of Major Professional and Participation Sports, *Submission*, p. 3; see Haff, G., 'A Roundtable Discussion', *National Strength and Conditioning Journal*, vol. 32, no. 2, pp 35–45.

21 National Institute Network, *Submission 14*, p. 2.

22 Dr Jason Mazanov, *Submission 1*, p. 2.

23 Dr Jason Mazanov, *Submission 1*, p. 2.

2.17 Assistant Professor Annette Greenhow of Bond University similarly emphasised the need to preserve and maintain the welfare of elite athletes. Her submission is:

> … focused on the special vulnerability of some athletes who place trust and confidence in others to protect their interests, with the expectation of technically competent practices and compliance with the law … Operating within a highly competitive environment, with economic, social and psychological drivers to achieve peak performance, opportunities may arise for the possible exploitation of this special vulnerability in the pursuit of success.[24]

2.18 Applied Scientists of Queensland also noted the 'influence which sports scientists can have over coaches and athletes, especially younger more vulnerable athletes'.[25]

Decision making impacting athlete health

2.19 Whereas once sport was a 'recreational and casual pastime where even the top-level players had full-time jobs', it has become increasingly professional at the elite level. Dr David Hughes, Chief Medical Officer at the AIS, described this change:

> Things have evolved enormously over the last 30 years in terms of the professionalism of sport and in the ability of athletes to make a full-time career in some of those codes. But what has not happened is that the government's framework involved in those sports has not evolved and kept pace, and I believe that this disparity is what has caused these problems to arise.[26]

2.20 Dr Hugh Seward, Chief Executive of the Australian Football League Medical Officers Association (AFLMOA), noted that the rise in the number of qualified sports scientists parallels the transition of Australian Football League (AFL) players to full-time professionals.[27] Dr Seward argued:

> The combination of these two factors—the expertise of the sports scientists and the availability of the players—has results in fitter, bigger, stronger and faster AFL players. But this has also changed the dynamic of managing injured players. Once the sole domain of the club doctors and

24 Assistant Professor Annette Greenhow, *Submission 8*, p. 2.

25 Applied Scientists of Queensland, *Submission 16*, p. 4.

26 Dr David Hughes, Chief Medical Officer, Australian Institute of Sport, Australian Sports Commission, *Proof Committee Hansard*, 12 June 2013, p. 6.

27 Dr Hugh Seward, Chief Executive Officer, Australian Football League Medical Officers Association, *Proof Committee Hansard*, 12 June 2013, p. 51.

> physiotherapists, now these disciplines work collaboratively in the preparation, assessment, treatment and rehabilitation of player injuries.[28]

2.21 This may be impacted, however, by the fact that Australia's Olympic squads and AFL, National Rugby League (NRL), cricket, rugby and soccer teams do not employ full-time doctors.[29] This may mean that medical professionals are not involved in decision making to the appropriate extent.

2.22 Dr Seward advised that while each AFL club has two to four doctors, none of these are employed on a full-time basis:[30]

> Unfortunately club doctors are one of the few remaining part-time workers at AFL clubs and clubs often choose to have full-time employees to undertake an administrative component to their role.[31]

2.23 Dr Larkins submitted that as a result:

> Concerns have been raised in medical circles in recent years in relation to the influence that certain 'sport science' individuals have exerted on player preparation, injury rehabilitation and, in more recently publicised cases, medication and supplement administration.[32]

2.24 He submitted that there are:

> … clear examples in Australian sport where the role of the medical practitioner has been undermined and even usurped by non medical individuals and that sporting codes and associations have allowed this to happen.[33]

2.25 Dr Seward similarly indicated to the committee that 'with the increasing influence of sports science, sometimes that encroached on what we, the medical officers, felt was purely medical decision-making'.[34] Dr Seward argued for the need for a collaborative approach in relation to the use of supplements:

> The preferred model would be for the sports scientist in conjunction with a sports nutritionist, a dietician, and the doctor to go through what they may wish to use together and come to a decision about what is safe, what is

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28 Dr Hugh Seward, Chief Executive Officer, Australian Football League Medical Officers Association, *Proof Committee Hansard*, 12 June 2013, p. 51.

29 Dr Peter Larkins, *Submission 3*, p. 3.

30 Dr Hugh Seward, Chief Executive Officer, Australian Football League Medical Officers Association, *Proof Committee Hansard*, 12 June 2013, p. 59.

31 Adam Cooper, 'Sports science body wants greater regulation', *The Age*, 8 February 2013.

32 Dr Peter Larkins, *Submission 3*, p. 3.

33 Dr Peter Larkins, *Submission 3*, p. 4.

34 Dr Hugh Seward, Chief Executive Officer, Australian Football League Medical Officers Association, *Proof Committee Hansard*, 12 June 2013, p. 53.

> appropriate and, of course, what is legal and complies with the WADA code. That is what should happen.[35]

2.26 Despite stressing the need for collaboration, Dr Seward argued that there is scope for club doctors to 'play a more strategic role within their clubs that has perhaps been overlooked over the last few years'.[36]

2.27 Dr Larkins suggested that, underpinning the multidisciplinary team, the medical practitioner plays a crucial role in 'overseeing the health of the athlete and ensuring that the welfare of the individual is paramount at all times'. In his view, a medical practitioner:

> … is best placed to assess health issues and is the only individual able to legally prescribe medications and make clinical assessments when there is a health problem arising, be it an injury, illness or mental health concern.[37]

2.28 While collaboration between sports scientists and club doctors is important, ESSA's Professor David Bishop similarly believes that 'the doctor should have the final say because the health of the athlete needs to be the primary concern'.[38]

2.29 The committee's view is that the protection of athlete health and welfare must always be the highest priority and overriding consideration in the pursuit of improved performance.

The collaborative role of sports scientists

2.30 Several contributors to the inquiry referred to the need for a collaborative approach where a sports science team provides a coaching panel with evidence-based approaches to athlete development and performance. Professor Damian Farrow outlined how this may work in practice:

> For instance, the coach presents the group with a question such as Player X has a problem kicking goals in Australian rules football.
>
> A biomechanist, skill acquisition specialist, psychologist and performance analyst may work collaboratively to compile the objective information required to diagnose whether this is really true, and if so in what context, and provide the coaches with a plan of attack to improve that skill.
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> Similarly, the physiologist, recovery specialist, nutritionist, psychologist, physiotherapist and doctor may all collaborate on issues to do with a player's health.[39]

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35 Dr Hugh Seward, Chief Executive Officer, Australian Football League Medical Officers Association, *Proof Committee Hansard*, 12 June 2013, p. 55.

36 Dr Hugh Seward, Chief Executive Officer, Australian Football League Medical Officers Association, *Proof Committee Hansard*, 12 June 2013, p. 59.

37 Dr Peter Larkins, *Submission 3*, pp 2–3.

38 Adam Cooper, 'Sports science body wants greater regulation', *The Age*, 8 February 2013.

2.31 Professor Farrow noted that a collaborative team is 'the best method of providing the immediate peer review required to ensure any recommendation made to the coaches is principled in science, safe and legal'.[40] Professor Kevin Thompson also spoke of peer review as a necessary component of collaboration:

> For me, if you have people who are suitably trained, [ethically] trained, aware of boundaries, aware that you need an evidence base for practice, can weigh up risks and benefits and then when a coach or an athlete requests an intervention, whether that be pharmacological or training change or whatever, that request can be suitably peer-reviewed. It is not necessarily one person; it is a team of individuals. That is a strength, then, that within that team you make a decision.[41]

2.32 Applied Scientists of Queensland emphasised the need for a collaborative process within sporting organisations 'which benefits from open communication channels between manager and scientists'.[42]

2.33 The SMA suggested that:

> In a vast range of sports, sports scientists work collaboratively with medical practitioners (medical officers), physiotherapists, dietitians and other members of the sports medicine support team to ensure that the wellbeing and health of the athletes are at the forefront of all decisions.[43]

2.34 Concerns have been raised, however, about the position some sports scientists have held within sporting clubs and the degree of independence they have operated under. Former SMA president Dr Peter Larkins has referred to 'lone wolf' sports scientists, who are 'given a lot of authority and power by the clubs that employ them'.[44]

Support for, and criticism of, sports scientists

2.35 A number of commentators have supported the role of sports scientists and the history of their contribution to sport in Australia. Journalist Mr Tim Lane wrote:

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39 Professor Damian Farrow, 'Tarred with the same brush: what do sports scientists do?', *The Conversation*, 11 February 2013.

40 Professor Damian Farrow, 'Tarred with the same brush: what do sports scientists do?', *The Conversation*, 11 February 2013.

41 Professor Kevin Thompson, Director, National Institute of Sport Studies, University of Canberra, *Proof Committee Hansard*, 12 June 2103, p. 32.

42 Applied Scientists of Queensland, *Submission 16*, p. 4.

43 Sports Medicine Australia, *Submission 5*, p. 4.

44 Rick Morton, '"Dodgy" scientists outside the rules', *Australian*, 8 February 2013.

> Over three decades, sports scientists at various Australian centres of excellence have made a brilliant contribution to much of our Olympic and other international success.[45]

2.36 Several submitters to this inquiry also praised the role and achievements of sports scientists in Australian sport. For example:

- Athletics Australia (AA) submitted that Australia's 'small population and geographic challenges mean that our international success in the sport of Athletics has always depended on world leading innovation by our coaches and sports scientists'.[46]
- The AOC submitted that:

  > Australia has long enjoyed a reputation in international sporting arenas for having leading sports science/sports medicine practices and personnel. In that regard, sports science and sports medicine has played a significant role in the success enjoyed by many Australian Olympic athletes.[47]

- ACSP referred to the 'enormous contribution' of sports scientists to Australian sport.[48]
- Dr Robins Willcourt—a sports scientist and director of Epigen Integrated Medicine—described his profession as 'integral to the functioning of all professional sporting codes'.[49]
- SMA noted that:

  > Australian sports scientists are highly sought after, and respected throughout the world, for the contribution they can make to maximising athletic potential and performance on the field.[50]

2.37 From humble beginnings, a sizeable industry has grown. It has been estimated that there are approximately 400 to 500 people working as professional sports scientists in Australia.[51] After pioneering sports science in Australia the AIS now has

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45 Tim Lane, 'Sports science has its place', *Sunday Age*, 10 February 2013.

46 Athletics Australia, *Submission 4*, p. 1.

47 Australian Olympic Committee, *Submission 12*, p. 1.

48 Australasian College of Sports Physicians, *Submission 10*, p. 1.

49 Dr Robin Willcourt, *Submission 6*, p. 1.

50 Sports Medicine Australia, *Submission 5*, p. 3.

51 Professor David Bishop, Director, Sports Science, Exercise & Sports Science Australia, *Proof Committee Hansard*, 12 June 2013, p. 39.

about 80 sports scientists on its staff and is the largest employer of the profession in the country.[52]

2.38 Professor Peter Ficker was the first scientist to be appointed to the role of director of the AIS. A highly qualified sports scientist, Professor Ficker spoke in 2005 of the pursuit of the 'edge' and the need 'to keep working on the very, very cutting edge of these applications … that keep us competitive'.[53] He called for scientific research and its associated technology to take a more prominent role to achieve world-class results.

2.39 In an article Professor Farrow referred to another pioneer, Professor Allan Hahn, as 'one of the fathers of sports science'.[54] Commemorating Professor Hahn's retirement as AIS Chief Scientist after more than 27 years' service in sport, Dr Jodie Richardson wrote that:

> In his time at the AIS, Professor Hahn describes sports technology as having a powerful influence over the entire high-performance athlete development process. He likens the development of high-performance athletes to the product development practices in other industries ... Professor Hahn emphasises that at all levels, from club athletes through to international competitors; the aim is to develop, refine and promote winning products.[55]

2.40 In Professor Hahn's view:

> … sports technologies play a significant role in the measurement of the physiological and biomechanical parameters crucial to high-performance in any sport. Techniques including VO2 maximum testing, genotyping, mathematical modelling of performance; and devices such as force plates

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52 Greg Baum, 'New AIS guidelines give clubs more medical responsibility', *Sydney Morning Herald*, 29 May 2013; Australian Institute of Sport, 'AIS unveils sports science principles to guide sports', 29 May 2013, http://www.ausport.gov.au/news/ais_news/story_531645_ais_unveils_sports_science_principles_to_guide_sports (accessed 31 May 2013).

53 Peter Brewer, 'Fricker shares vision to keep Australia ahead of competition', *Canberra Times*, 13 May 2005.

54 Professor Damian Farrow, 'Tarred with the same brush: what do sports scientists do?', *The Conversation*, 11 February 2013.

55 Dr Jodie Richardson, *Reflections of Professor Allan Hahn on the role of technology in high-performance sport*, 28 October 2011, http://www.ausport.gov.au/ais/innovation/news/story_460160_reflections_of_professor_allan_hahn_on_the_role_of_technology_in_high-performance_sport (accessed 24 May 2013).

> and GPS, provide important evidence-based determination of the characteristics of an elite athlete.[56]

2.41 The study of sport and exercise science is also a relatively new area of academia—Australian universities only began offering degrees in the field in the early 1980s.[57] However, there are now 12 universities offering fully accredited courses in Australia, and 3000 students graduating from sport and exercise science courses a year.[58] This trend may partly reflect an increasing demand from the professional sporting industry.

2.42 The general view of the witnesses who appeared at the public hearing is that issues within the practice are isolated rather than endemic.

2.43 Mr Richard Eccles, Deputy Secretary of DRALGAS, argued that it is:

> … important to remember that the vast majority of sports scientists operate within appropriate ethical frameworks and have athletes' safety as their primary area of concern.[59]

2.44 The NIN told the committee:

> We are very confident that the vast majority of sports scientists, particularly those working in the Institute Network, are doing the right thing.[60]

2.45 Mr Nello Marino, Chief Executive of Sports Medicine Australia (SMA), told the committee that based on feedback provided to him by practitioners, SMA does not believe that problems are endemic in the profession:[61]

> We think there were some practices that were revealed through the ACC report, but we are not certain whether that was necessarily the case across all of sport or necessarily all of the large codes.[62]

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56 Dr Jodie Richardson, *Reflections of Professor Allan Hahn on the role of technology in high-performance sport*, 28 October 2011, http://www.ausport.gov.au/ais/innovation/news/story_460160_reflections_of_professor_allan_hahn_on_the_role_of_technology_in_high-performance_sport (accessed 24 May 2013).

57 Joanna Mather, 'Sport science's dose of reality', *Australian Financial Review*, 15 April 2013.

58 Joanna Mather, 'Sport science's dose of reality', *Australian Financial Review*, 15 April 2013.

59 Mr Richard Eccles, Deputy Secretary, Department of Regional Australia, Local Government, Arts and Sport, *Proof Committee Hansard*, 12 June 2013, p. 2.

60 Dr Ian Ford, Director, Northern Territory Institute of Sport, National Institute Network, *Proof Committee Hansard*, 12 June 2013, p. 20.

61 Mr Nello Marino, Chief Executive Officer, Sports Medicine Australia, *Proof Committee Hansard*, 12 June 2013, p. 72.

62 Mr Nello Marino, Chief Executive Officer, Sports Medicine Australia, *Proof Committee Hansard*, 12 June 2013, p 72–73.

2.46 SMA described the impact of the Australian Crime Commission (ACC) report as overshadowing the 'valuable work provided by the vast majority of sport scientists who provide ethical, legitimate and untold benefit to their athletes and clientele'.[63] However, the SMA submitted that:

> The fact that many of such individuals exhibiting unconventional, unethical and unsafe practice highlights some of the inadequacies in a number of sporting environments into which individuals are able to be employed without any accountability to a codes of practice or similar ethical codes.[64]

2.47 ESSA stressed to the committee that the rogue individuals, identified by the media as 'sports scientists' following the release of the ACC report, should not be labelled in this way.[65] It argued that those individuals would not be eligible for accreditation with ESSA and would not call themselves 'sports scientists'.

Committee's view

2.48 The committee notes that the diverse views about what sports science is, and the breadth of the activities that several definitions attribute to the profession, reflect the lack of an official definition. The committee believes that there is, and should be, a difference between sports medicine and sports science. The committee agrees with definitions that refer to sports science's focus on improving performance and views ESSA's definition as a useful working definition.

2.49 This lack of definition is a significant barrier for policy-makers, as it is difficult to effectively regulate an undefined sector.

63 Sports Medicine Australia, *Submission 5*, p. 4.

64 Sports Medicine Australia, *Submission 5*, p. 4.

65 Professor David Bishop, Director, Sports Science, Exercise & Sports Science Australia, *Proof Committee Hansard*, 12 June 2013, p. 37.