

**ASSEMBLING HIGH
PERFORMANCE:
AN ACTOR NETWORK THEORY
ACCOUNT OF GYMNASTICS IN
NEW ZEALAND**

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by Roslyn Kerr

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Abstract

During every summer Olympic Games, the sport of gymnastics rises briefly to the world's attention as the public admire the incredible skills and feats performed by fit muscular bodies on a range of apparatus. The gymnastics they watch consists of performances in which bodies assemble with apparatus. This thesis utilises an Actor Network Theory (ANT) perspective to follow this assembling of gymnastics in the five codes of competitive gymnastics competed in New Zealand: women's artistic gymnastics, men's artistic gymnastics, rhythmic gymnastics, trampolining and competitive aerobics.

This thesis is a descriptive ethnography of the world of high performance gymnastics. It begins by examining some of the controversies that have operated to both criticise and rework the sport. Next, the gymnasts are followed through the selection processes that lead them to become members of national squads and teams. It then moves to the training gymnasium and examines the variety of non-human actants that work in the gymnasium to assemble gymnastics. The next two chapters examine how gymnasts are found to enrol and assemble with video technologies and sports science professionals in their efforts to improve performance. Following this, gymnasts are observed to produce a routine at a competition which is translated into a score and ranking through the highly complicated and laborious process of judging. Finally, the thesis concludes with the story of Angela McMillan, New Zealand's most successful athlete within the gymnastic codes. Throughout are a range of accounts from participants, together with observations, describing attempts to secure the stabilisation of gymnastics as an actor-network that produces internationally successful athletes.

All the networks followed involve a continual process of enrolling, un-enrolling, translating and mediating, with power constantly shifting and being shared between various heterogeneous actants including coaches, parents, the national federation and the international federation. At times these networks stabilise with particular actants, such as sports scientists or technologies, being enrolled, while at other times the paths of the networks come to an end as particular assemblages or actants, such as physical ability tests, are no longer enrolled. In contrast to a perception that successful high performance sports include key actors and resources, this thesis shows how the networks that produce high performance gymnasts are highly unpredictable and messy, with humans and non-humans both equally influential in affecting every branch of the networks. Processes such as talent identification, training and judging are found to be complicated and unstable.

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Chapter One

Introduction

This thesis utilises Actor Network Theory (ANT) to trace the high performance gymnast from the beginner child to a successful international athlete. It examines the selection process into high performance, the training regime, the use of technologies and scientists to create a more effective gymnast, the labour of judging and finally the overall question of how to be successful. There are five types, or “codes” of competitive gymnastics contested in New Zealand and examined: women’s artistic gymnastics, men’s artistic gymnastics, rhythmic gymnastics, trampolining and aerobics¹.

An Introduction to the Five Gymnastic Codes in New Zealand

The term: ‘gymnastics’ is widely used in a number of connotations. This thesis is concerned with only one of these permutations: competitive elite gymnastics, or ‘high performance’ which refers to gymnasts who are training with the goal of eventually representing New Zealand at the highest level of competition, such as at World Championships and Olympic Games. In New Zealand, each of the five codes includes an option where gymnasts can compete purely within New Zealand in ‘Levels’ or ‘age groups’², or they can compete in the high performance stream. These two options are sometimes referred to as ‘National Stream’ and ‘International Stream’ respectively. My research is focused almost exclusively on the international stream. For each code and both streams, New Zealand includes a National Championships, as well as a range of local and regional competitions.

The rules for each code are set internationally by the International Gymnastics Federation (FIG). Every four years after every Olympic Games, the FIG updates the gymnastics rulebook, known as the Code of Points. This structure makes the sport somewhat unusual, as few sports include a complete reworking of the rules every four years. In this sense, it is highly unstable and part of achieving success in gymnastics involves keeping up to date with the constant changes to the rules. The Code of Points sets out the general rules for each apparatus in all the five codes, and details what elite

¹ The International Gymnastics Federation includes a 6th competitive discipline: Sports Acrobatics, however there are no participants in this discipline in New Zealand.

² In men’s and women’s artistic gymnastics, and rhythmic gymnastics, there is a 10 level system within New Zealand. Gymnasts who compete in these levels usually have the National Championships as their final goal. In trampolining and aerobics, the gymnasts compete in an age group system as the alternative to high performance. In both the levels and age groups, gymnasts are often believed to be training more as a fun activity. By contrast, gymnasts in the high performance stream are considered to experience much more intensive training in line with having a much more ambitious and competitive goal.

competitive gymnastics routines should entail. In New Zealand, there are further documents produced by the national gymnastics federation, which describe the beginner and intermediate level rules for competitions purely within New Zealand. The following section provides a brief introduction to the apparatus and rules of each of the five codes, as dictated by the 2005 – 2008 Codes of Points.

Men's artistic gymnastics

Men's artistic gymnastics includes competing on six apparatus: floor exercise, pommel horse, rings, vault, parallel bars and high bar.

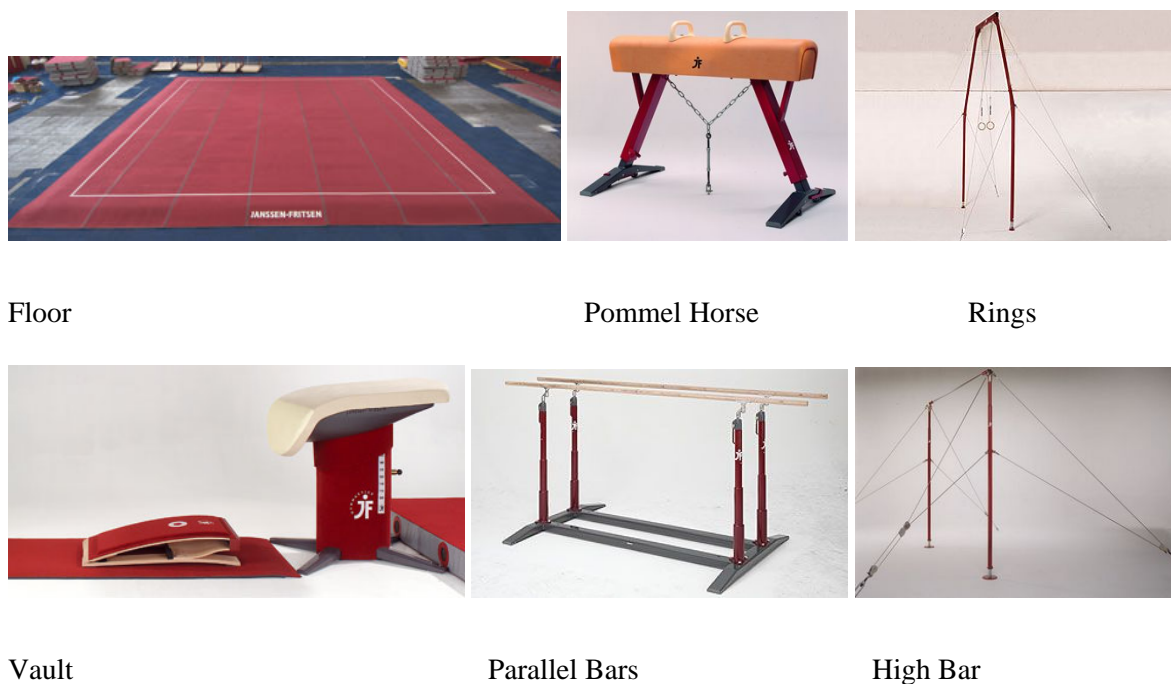


Fig. 1.1 Men's artistic gymnastics apparatus. Janssen and Fritsen (2008). Retrieved from www.janssen-fritsen.com

On each apparatus apart from vault, men must complete a routine demonstrating a wide variety of elements. On floor these are primarily acrobatic in nature, with some balances. On pommel horse and high bar, the gymnast must perform primarily swinging elements and is not permitted to stop during a routine. On rings, the gymnast primarily performs strength elements together with some swinging elements. On parallel bars, the gymnast performs a mix of swinging, strength and balance elements. On vault, the gymnast simply performs a long run, culminated in a single acrobatic element over the vault.

Men's artistic gymnasts are required to compete wearing a tight fitting leotard, along with shorts on vault and floor and 'longs' on the other four apparatus. 'Longs' consist of semi-tight trousers made

from lycra. Floor routines are limited to 90 seconds in length, while all other apparatus have no time limit.

There are three types of competition: individual all around, individual apparatus, and team competition. Although historically men were required to perform on all six apparatus, it is becoming increasingly common for men to specialise in only one or two apparatus and therefore compete only in the apparatus and/or team competition. Men's gymnastics includes six apparatus, more than any other gymnastic code. It takes an enormous commitment to train enough to be highly successful on all six apparatus and as a result, it is unusual for a male gymnast to be able to be successful at the highest level in the all-around and in all six apparatus. Gymnasts who are able 'to medal' in the all around and in a number of apparatus are given star status both within and outside gymnastics owing to the outstanding nature of this achievement. Vitaly Sherbo in 1996 and Alexi Nemov in 2000 are the two most recent gymnasts to have achieved this status. It is theorised that since changes in the Code of Points in 2000 which required an increased level of skill on all of the apparatus, it has become very difficult for any male gymnast to achieve all around and apparatus success. Instead, specialists who compete on only a few of the six apparatus are becoming more common. For example, Romanian Marian Dragulescu has made a career out of specialising in the two apparatus of vault and floor exercise where he has won eleven World and Olympic medals, eight of them gold, on these two apparatus since 2001.

Women's artistic gymnastics

Women's artistic gymnastics includes four apparatus: vault, uneven bars, balance beam, and floor exercise.



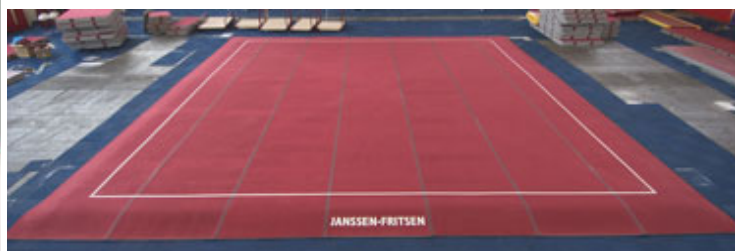
Vault



Uneven Bars



Beam



Floor

Fig. 1.2 Women's artistic gymnastics apparatus. Janssen and Fritsen (2008). Retrieved from www.janssen-fritsen.com

Like men's gymnastics, women's artistic gymnastics includes three competitions: individual all around, individual apparatus, and team competition. Women's gymnasts compete wearing a tight fitting leotard, with or without sleeves. Floor and beam routines have a time limit of 90 seconds while there are no time limits on vault or uneven bars.

Some of the apparatus are similar in nature to the men's apparatus. Vault is identical, with both codes using the exact same rulebook and equipment. Women's uneven bar routines are similar in nature to men's high bar routines, consisting almost completely of swinging orientated elements. However, while men swing only around a single high bar, women swing around and between two bars. Women's floor routines are somewhat different to men's routines. Although women perform the same sequences of acrobatics, unlike men's routines, women's routines include a requirement to perform dance movements, and the routines are performed with a musical accompaniment. Balance beam is the only apparatus unrelated to men's gymnastics. On beam, women perform a mix of acrobatics and dance movements.

As is described in more detail in the following chapter, women's artistic gymnastics is currently the most practised and famous type of gymnastics. In New Zealand, it is particularly popular with young

girls aged 5 – 10, with women’s gymnastics being the 4th most popular club sport for girls in New Zealand and the only type of gymnastics to feature in any participation statistics (Van Aalst, Kazakov and McLean, 2001, p. 28). This is also the case at the international level. At mega events such as the Olympic or Commonwealth Games, it is far more difficult to obtain seats to the women’s artistic gymnastics all around competition than to any other type of gymnastic event.

Rhythmic Gymnastics

Rhythmic is unique in gymnastics in being the only code that includes hand held apparatus in all routines. The five apparatus used in rhythmic are: rope, hoop, ball, clubs and ribbon, although these are rotated so an elite individual gymnast will use only four of these in one calendar year.



Rope



Hoop



Ball



Clubs



Ribbon

Fig. 1.3 Rhythmic Gymnastics Apparatus. NZG (2007). Retrieved from www.nzgymnastics.co.nz

Rhythmic gymnastics involves the performance of dance style movements similar to a women’s artistic floor routine working together with the rhythmic apparatus and music. Rhythmic involves two types of competition: individual and group. Individual competitions involve a gymnast with one apparatus performing a 90 second routine to music. Group involves 5 people with 5 apparatus, which may be the same apparatus or different, performing a 150 second routine to music. Rhythmic

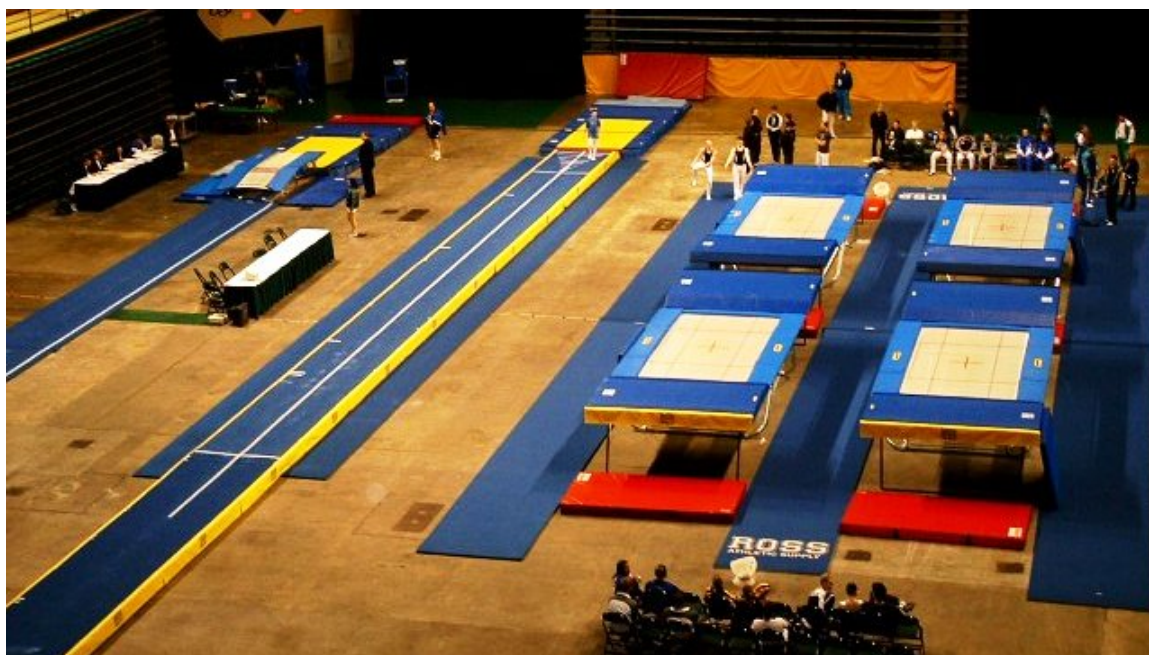
gymnasts perform for judges while wearing tight fitting leotards usually with skirts, and are restricted from performing any kind of acrobatic elements. Rhythmic takes place in halls which need to be at least 9m in height, as the apparatus need to be thrown this high in order to score points; however the very unstable nature of the equipment means rhythmic cannot effectively take place outdoors where there would be no restriction in ceiling height as rain and wind would ruin the equipment.

Just as in artistic gymnastics, where men and women are both required to perform different types of elements on different apparatus, rhythmic has similar requirements. In rope routines, gymnasts are required to include a large number of leaps, in ball they must show impressive flexibility, in rope they must demonstrate a range of balances, in ribbon they need to perform 'pivots' or turns, and in hoop they are required to show a mix of all these movements³.

Trampolining

Trampolining was the last of the five codes to become part of the gymnastics 'family' in New Zealand, only being officially incorporated into the gymnastics organisational body in 2006. There are four types of competition within trampolining: individual trampoline, synchronised trampoline, double-mini trampoline and tumbling.

³ In 2010, this will change. As an example of how unstable the rules can be in gymnastics, in 2011, rope is being removed as one of the competitive apparatus for senior international gymnasts. Therefore, in 2010, the rules are different in order to prepare gymnasts for the removal of rope in 2011. While the reasons for this change are not stated by the FIG, it is speculated by participants that there were two primary reasons for the change. Firstly, the rope does not show up well on television. Secondly, many coaches felt that the rope requirements did not work well with the ideal body type required for the other apparatus.



A trampoline competition. The Double Mini Tramp is located on the far left, the tumbling floor in the middle, and four trampolines on the right.



Two competitive trampolines set up for synchronised trampoline



Double Mini Tramp

Fig. 1.4 Trampoline Apparatus. Ross Athletic (2008). Retrieved from www.ross-athletic.com

In contrast to artistic and rhythmic gymnastics which include an ‘all around’ competition where competitors must compete in all the available apparatus, trampolining allows competitors to compete in as few or as many of the disciplines as they like and has no all around award. It is also open equally to men and women, who compete with exactly the same rules, although not against one another. Competitors wear the same attire as in artistic gymnastics, with men wearing leotards and longs for trampolining and shorts for double-mini and trampoline, while women wear leotards with or without sleeves.

Individual trampolining involves a single gymnast performing a routine that includes 10 bounces. In a competition, the trampolinist must perform two routines. One is a compulsory routine, where the

trampolinist must perform particular elements, and the other a voluntary routine, where the trampolinist generally performs their most difficult elements. Synchronised trampolining involves two trampolinists performing an identical trampoline routine side by side. A synchronised routine is judged with respect to skill level, like an individual trampoline routine, and on how accurately the two bodies are synchronised. Double mini tramp is in some ways like the artistic gymnastics vault. Like vault, it involves a 20m run up, but on double mini tramp the trampolinist then performs two acrobatic elements before landing on a mat. Historically, New Zealand has performed better in double mini tramp than in the other trampolining disciplines. Tumbling is the least popular trampolining discipline. It involves a very long run up, of around 40m, where the trampolinist runs and performs a long row of connected acrobatic elements. Tumbling resembles the acrobatic sequences performed by artistic gymnasts on the floor, however the tumbling floor is much longer and so where artistic gymnasts may only perform 3 – 5 skills across the floor on a diagonal, tumblers perform 10 or more. The tumbling floor is also far more sprung than an artistic gymnastics floor, allowing competitors to perform more spectacular and difficult tricks.

Aerobics

Competitive aerobics demonstrates the potential messiness of sports classification in being the only gymnastic code which is not completely affiliated to the New Zealand national body. In New Zealand, as in a number of other countries, competitive aerobics is split between two types of competition. One is run by the FIG, to their rules, and is administered by GymSports New Zealand. The other type is run by FISAF (Federation of International Sports, Aerobics and Fitness) and in New Zealand, is administered by NZCAF (New Zealand Competitive Aerobics Federation).

In attending a competition and watching both types of aerobics, there appears little difference in the movements performed. Both involve performing an aerobics routine on a 7m x 7m wooden floor to music which consists of similar movements to those traditionally performed in aerobics classes in gymnasiums worldwide.



Fig. 1.5 The Aerobics stage at World Championships, 2006. FIG (2006). Retrieved from www.fig-gymnastics.org

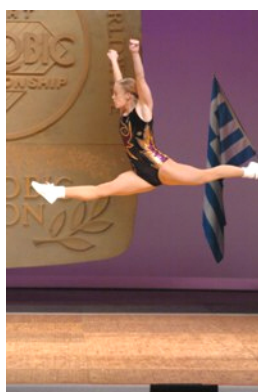


Fig. 1.6 Angela McMillan, NZL, World Champion 2004 competing at World Championships 2004. NZG (2004). Retrieved from www.nzgymnastics.co.nz

In both cases, it is possible to compete as individuals, pairs, or groups. However the FISAF version includes a far wider range of competitions than the FIG. While the FIG only offers aerobics, FISAF offers aerobics as one of three competition categories, also offering fitness and hip hop competitions. Whilst FIG competitors are restricted to wearing a one piece leotard, the clothing worn by the FISAF competitors is far more varied, particularly for those in the fitness categories, who commonly wear two piece leotards or much 'fancier' costumes such as involving long brightly coloured lycra leggings covered in glitter or sequins.

As this introduction shows, each code varies in the apparatus used and their requirements. This thesis follows these debates in the different codes, gymnastics clubs and at competitions in New Zealand. In addition, it shows how these variations incorporate very different ways of working. There is constant debate both within and between the codes about how each code should operate most effectively.

Methodology

This thesis experiments with the work of Bruno Latour, and others working from an Actor Network Theorist (ANT) perspective, as a possibility for understanding sporting practice. Latour's work has predominantly been influential in the sociology of science and technology where among other things, it has been utilised in examining the sociology of new innovations (for example, see Doolin and Lowe, 2002; Farnsworth and Austrin, 2005; Hennion, 1989; Michael, 2000). As gymnastics exists through the constant creation of new innovative movements and routines, the utilisation of a sociology designed to study innovations (Latour, 2005) seemed appropriate. While my account of gymnastics is predominantly an ethnography, it differs from a traditional ethnography due to the equal attention paid to the human and non-human 'actants' which configure the sport. In contrast with other accounts of gymnastics, as described in chapter two, I make my case through description (Latour, 2005) rather than using an explanatory framework.

Latour, along with his colleagues Callon, Law, Woolgar and many others in the school of ANT, argues against the traditional sociological method of beginning with a framework or theory before commencing fieldwork. As Law (1992, p. 2) explains:

If we want to understand the mechanics of power and organisation it is important not to start out assuming whatever we wish to explain. For instance, it is a good idea not to take it for granted that there is a macrosocial system on the one hand, and bits and pieces of derivative microsocial detail on the other.

Some analyses of sport argue that the macro/micro binary is precisely the distinction that must be made. For example, Slack and Parent (2006) argue that examining sport from an organisational perspective involves understanding the distinction between the macro, or organisational theory, and the micro, organisational behaviour. Latour (1995) argues that through following what he terms 'actants': both human and non human actors, the trajectories and translations between the micro and macro are revealed, making the distinction between them superfluous. As Law (1994) points out, beginning with an assumption that some structures are macro and others micro inhibits the questioning of why and how these structures work as their definition pre-supposes that they will work in particular ways.

One argument actor network theorists give against beginning with a framework is that this presupposes sociologists have "hidden" knowledge, which exists as "theory", that is revealed to them through the use of their frameworks which the participants do not have the knowledge or time to see

(Law, 1992, p. 2; Latour 2005, p. 150). Latour instead argues that it is the sociologists who lack the knowledge of what the participants do and that it is for the sociologists to learn from the actors about their world:

It is us, the social scientists, who lack knowledge of what they do, and not they who are missing the explanation of why they are unwittingly manipulated by forces exterior to themselves and known to the social scientist's powerful gaze and methods. (Latour, 1999, p. 121)

Instead of aiming to explain the world under observation, Latour (1999) and Law (1994) argue the goal should be to describe the world and the explanation will be revealed through the depth of the description. A traditional sociological perspective may argue that this description is insufficient, that there is something missing “since we have not ‘added to it’ something else that is often called an ‘explanation’” (Latour, 2005, p. 137). However, this thesis shows that a detailed description generates explanations without needing to ‘add’ something more. The participants in the sport provide detail which allows a description of gymnastics to be built up which reveals the workings of the sport. Furthermore, this perspective does not select ‘empirical data’ or erase data in order to fit a particular explanation.

This level of detail therefore allows the workings of the sport to be revealed beyond the structural level. As Kaghan and Bowker (2001, p. 258) describe, ‘traditional’ analyses of processes tend to “black box” systems as occurring as a particular set of inputs which produce particular outcomes. In the case of high performance sport, this is a common way to analyse the effect of particular sporting systems. For example, Green and Oakley (2001) compare the elite sporting systems between a number of countries with the goal of tracing the flow of Eastern bloc systems outward to Western nations. In their study, the interest is in identifying facets of the system that have been adopted by various countries. In such accounts, the systems are essentially black boxed as they are assumed to have very particular inputs and outputs. This thesis differs in emphasis by examining the “mess” beyond the “black box” (Kaghan and Bowker, 2001, p. 258) to determine the detailed workings of the sport. While the gymnastics codes in New Zealand have a system in place for producing successful athletes, my research is less interested in how this system is assumed to work. I aim to produce a detailed descriptive account of the actual workings of the sport.

Gymnastics as Socio-Technical

The description here differs from what may be expected in a traditional ethnography through the attention paid to non-humans. Using the example of the door hinge as an assumed purely technological artefact, Latour (1988) describes how it can ‘act’ to shape the world and can behave in a

more reliable manner than many humans. As this thesis shows, non-human artefacts equally 'act' in the creation of gymnastics.

In sport, equipment, technologies and other non-humans are crucial. As philosopher of sport, Loland (2002), observes, they are constituent for sport in transforming people into athletes. For example, once a pole vaulter has a pole in their hands and the ability to use it, they can be transformed from an everyday person to somebody with the ability to jump several metres in the air. Similarly, the gymnast only becomes a gymnast once they assemble with the apparatus. In this way, the athlete can be seen as an assemblage or cyborg where through combining the human with the non-human, new abilities are created.

A central term used in this thesis is that of the 'assemblage'. Law (1994) describes how utilising the notion of the assemblage essentially reverses our conception of agency. A person is viewed as an assemblage of different components, and therefore an effect of this particular arrangement. In this research the gymnast is often referred to as the 'gymnast assemblage' in recognition that the gymnast is an assemblage of a body made up of particular muscles or talents + apparatus + leotard + training etc. with the form the assemblage takes affecting how the gymnast acts.

Introna (2009, p. 26) notes how the utilisation of a theory acknowledging the interconnection between humans and technologies is particularly relevant as the world moves to becoming more technologically mediated and "cyborgian". In the sociology of sport, a growing number of authors are examining the way athletes negotiate the connections between the natural and the artificial (see for example, Butryn and Masucci, 2009; Butryn, 2003; Butryn & Masucci, 2003; Chapman, 1997; Cole, 1993, 1998; Miah, 2004; Shogan, 1999; Wesely, 2001). As Butryn and Masucci (2009, p. 287) note, there is debate over whether 21st century sport is transgressing the natural/artificial boundary and there is a wish revealed by some sporting participants to keep sport "pure" or solely human, and untarnished by the introduction of artificial technologies.

Through using Latour (2005) and Law's (1994) notion of viewing the body as an assemblage, the question of what is natural and what is artificial is avoided. The use of this natural/artificial binary has meant that historically, examinations of sport and technology have revolved around the question of whether the natural creates the artificial or the artificial creates the natural. In terms of sporting performance, this is the question of whether a human performance causes the creation of new technological devices or whether new technologies create the human performance. For example, in gymnastics, in Kerr's (2003) history of women's artistic gymnastics, she found it difficult to determine whether the widening of the uneven bars in the 1980s occurred in reaction to the movements being performed by the gymnasts, or whether these movements were the result of the bars being widened.

With technological determinism at one extreme end, it has been argued that technology develops separately from the social context where it is used, but once used it then determines social practice (Roe Smith and Marx, 1994). At the other extreme end, it is theorised that technology and its resulting consequences are initiated entirely by social actors, a theory that falls under the vague category of SST, the social shaping of technology (Bijker and Law, 1992; Mackenzie and Wajcman, 1999; Rosen, 1993; Varney, 2002). For example, Rosen (1993) argues that the mountain bike was created in a specific design as a result of the environment around where the bikes were being made. He describes how one design, the clunker, became popular in Marin County, California, both because it was suited to the terrain and because the users had positive cultural associations with the bikes it was made from. Similarly, Varney (2002) describes how the creation of women's artistic gymnastics equipment was a result of the social position of women. She argues that each apparatus was designed to require less strength, and more grace and flexibility than the previously existing men's apparatus. She theorises that this was a response to the predominant male/female binary that assumes females to be less physically capable. While there is no doubt that both these arguments make valid points, in both cases the availability of the technological parts and what they could do was also crucial to the development of both the bike and gymnastics apparatus. In both cases, the equipment has altered significantly over the last several decades, undoubtedly as much because of the development of new improved materials as through human need and design. The bike, or the gymnastic apparatus, can be seen as a sociotechnical object, as an assemblage of human and non-human actants which is essentially unstable and constantly reassembling.

Butryn and Masucci (2009), following Ihde's perspective, are interested in the relationship of human athletes with technologies. They identify three forms this relationship can take. Firstly, technology as mediator, secondly, technology as embodied or an extension of the body, and finally technology as providing an alternative or other world experience (Butryn and Masucci, 2009). Using Ihde's framework, the distinction between humans and technologies remains, and the focus is on understanding the relationships that humans have with technologies (Verbeek, 2005). By contrast, this thesis, in line with the aims of ANT, is interested in tracing the workings of gymnastics as an assemblage of human and non-human actants and unravelling the networks that produce gymnastics. What both approaches share is an acknowledgement of the central position of non-humans in the production of sport, however ANT argues against any concept of the purely human existing as distinct from the non-human. Instead, ANT argues that social relations are always sociotechnical and that humans and non-humans should be treated as symmetrical actants (Latour, 2005).

As both Latour (1991, 1995, 2005) and Law (1994) point out, a crucial component of an ANT perspective is acknowledging that there is no purely social world. The social never exists as only human, but is at all times mediated by non-humans. As Law (1994, p. 2) describes, social order is not

social, but instead “materially heterogeneous: talk, bodies, texts, machines, architectures, all of these and many more are implicated in and perform the ‘social’.” With this in mind, the question of examining the social is replaced by an interest in following the socio-technical. This thesis examines the world of high performance gymnastics in New Zealand through following the socio-technical.

Gymnastics and Sport as Unstable

Through viewing sport as a network of continuously shifting assemblages, the unstable nature of sport is revealed. All sports include rule changes that affect how the sport operates, as well as the introduction of new technologies or new media. However, in gymnastics, rule changes frequently occur, making the constant change a significant component of the workings of gymnastics. In the sociology of sport literature, changes to rules or evaluation systems are commonly explained in two principle ways: to facilitate the spread and adoption of games and sport (see for example Elias and Dunning, 1986; Guttman, 1978) and as a reflection of the increasing commercialisation and spectatorisation of sports (see for example Goldlust, 1987; Rader, 1984; Brohm, 1978). While the former draws on a longer term historical perspective and pays attention to how games developed and spread through forms of standardisation and rationalisation, the latter emphasises that rules changes are the outcome of power struggles between various groups such as sponsors and media corporations. More broadly, discussions of rule changes concerning access and eligibility as well as fairness have focused on gender, sex, race and physical ability (see for example, Blue, 1987; DePauw and Gavron, 1995; Lenskyj, 1986; Messner & Sabo, 1990). In this thesis, the use of an ANT perspective allows the constant rule changes to be revealed as a central component of all the gymnastic codes in both training and competitions. The sport exists in a constant state of instability, with the continual change a standard part of gymnastics operations.

Law (1994, p. 5) argues that a tendency of the modernist world is to assume that the world would be a better place if all was “properly ordered”. This thesis demonstrates how in gymnastics, there is constant tension between the desire to ‘order’ the sport and an acknowledgement that the constant changes to the sport and the emphasis on innovation, creation and choreography are part of the sport’s fundamentally unstable nature.

From Dichotomies to Rhizomes

With this constant instability in mind, this thesis follows the network of assemblages in order to establish how gymnastics is produced. Latour (1999) and Law (1999) argue that “network” is a confusing and inaccurate word for describing this process. Latour (1999) explains how in the late 20th century, the word network began to be employed to describe instantaneous and unmediated access to information, particularly in relation to the internet. This is an opposite usage to what is meant when

the term network is employed in ANT, where it incorporates an active process of translation and transformation, quite different to the transport of information “without deformation” (Latour, 1999, p. 15). Instead, Latour argues that Deleuze and Guattari’s description of the world existing as a rhizome, a rhizome being a type of root that grows horizontally rather than vertically (Deleuze and Guattari, 1988; Markula, 2006), is a more accurate representation of what is meant by the term network in ANT studies (Latour, 1999). Deleuze and Guattari (Poxon and Stivale, 2005, p. 75) describe the rhizome, or multiplicity, as a representation of an active process of production, where following the rhizomatic flows reveals new a series of transformations.

Unlike the arborescent binary model commonly utilised in sociology, the rhizome connects “any point to any other point” (Deleuze and Guattari, 1988, p. 21):

Puppet strings, as a rhizome or multiplicity, are tied not to the supposed will of an artist or puppeteer but to a multiplicity of nerve fibres, which form another puppet in other dimensions connected to the first. (Deleuze and Guattari, cited in Poxon and Stivale 2005, p. 76).

Rhizomes can be broken in parts yet will start up again following their old line or creating a new line (Markula, 2006). The description in this thesis essentially aims to follow the “series’ and flows” (Poxon and Stivale, 2005, p. 75) of gymnastics. It shows how new lines are constantly created through new innovations and changes to the sport, while others break or split due to controversy and debate.

ANT Conceptual Vocabulary

Just as the word network incorporates a particular meaning as described above, ANT descriptions often utilise a number of terms that highlight the priorities of ANT theorists. A number of these terms are employed throughout this thesis.

Enrolment involves the stabilisation of the roles of all parties involved in the creation of a network (Callon, 1986; Tatnall and Davey, 2005). The enrolment process is particularly examined in chapters five and six, where attention is paid to how new technologies and scientists are enrolled into the gymnastics network.

The term actant refers to anything that shifts or makes action happen (Akrich and Latour, 1992). Latour (1991) prefers the term actant to actor as it incorporates non-humans as well as humans as having the ability to act. Throughout this thesis, the term actant is used when referring to both people and things that act.

Mediators are humans or non-humans that facilitate the actants acting (Latour, 2005). For example, in chapter four, many mediators are identified as necessary in training, such as foam pits and hand guards, for assisting the gymnast assemblage to produce gymnastics.

The point of departure for this research is to examine the 'programme' of high performance gymnastics. Anti-programmes are any programmes of actants that are in conflict with the programme chosen as the departure point for the research (Akrich and Latour, 1992; Latour, 1991). Therefore in this work, anti-programmes generally take the form of obstacles that interfere with or prevent the creation and production of the gymnast assemblage, such as the emotion of fear that can inhibit gymnasts from performing new skills.

Translation is the negotiation between actants which results in a common set of understandings or interpretations that facilitates the creation of a network (Callon, 1986). Chapter seven particularly pays attention to translation as it examines how a gymnastics routine is translated by judges into a numeric score.

An inscription is a physical manifestation of knowledge (Akrich and Latour, 1992). The most commonly referred to inscription in this thesis is the Code of Points. Inscriptions are identified as important and necessary because they allow knowledge to be circulated. Once knowledge has been produced in physical form, it is stabilised and can be passed between actants, or put another way, circulated.

These terms are not adopted as explanatory, but are utilised to draw attention to particular aspects of the sport that other accounts of gymnastics, as described in chapter two, have not tended to examine.

Following the Actants

This thesis 'follows' the network of gymnastics through tracing the processes of becoming a gymnast and producing gymnastics. However, of course it is not possible to follow the gymnast everywhere as the gymnast will have a personal life that it is impossible for the researcher to follow in detail (Michael, 2000). While these aspects of the gymnast are important, they are generally erased from accounts of following. As such, "following" refers not to the 24 hour per day observation of individuals, but to a "mapping of the moments" (Michael, 2000, p. 131) when the assemblage makes its appearance. This research maps the moments in which high performance gymnastics occurs.

The mapping began with the aim of observing all the high performance gymnasiums in New Zealand. In some cases, identifying these gymnasiums was a simple matter, with some gymnastics clubs having a team or group of international athletes all training together in one building. In these cases, there was

no doubt that it was a site where high performance gymnastics was produced. However, in other cases, the defining of high performance gymnastics, who was a high performance gymnast and who produced or was producing high performance gymnastics was difficult to establish with any certainty. Every study must have limited scope, but deciding on the limits can be problematic. Latour (2005) argues that groups exist only because the group members are constantly at work reworking the group boundaries and justifying the group's existence. Groups are not silent and passive (Latour, 2005, p. 31). The boundaries are constantly being defined by the actors in the group. In New Zealand, although the boundaries of the high performance or elite group are at times officially defined by the national gymnastics federation, within each gymnasium, there are spokespersons who also decide on the boundaries of the group, which may vary from the 'official' version. As the spokespeople are often referred to as the experts and have thought about this issue extensively, I followed the boundaries established by the spokesperson in each environment. This allowed the actors, as experts, to define the framework of the research.

As a result, the high performance gymnasts and gymnastics that were followed were what the group defined as such. All ten of the training centres that were defined by someone, indeed usually many people, as high performance were visited. A minimum of two days training at each gymnasium was observed. Depending on access, this was usually much longer and in some cases weeks or months of observations took place, along with interviews with any agreeable participants at the gymnasium. The process of interviewing involved seeking out participants who appeared to be informed and competent. Finding informed participants is a key aspect of all sociological research that Latour equally argues to be significant and necessary in ANT (Austrian and Farnsworth, 2005; Latour, 2005; Simpson, 2007). Formal interviews took place with 47 participants, who ranged from gymnasts, coaches, judges, parents and administrators. All were heavily involved in the sport at the high performance level and therefore highly informed as to the workings of the sport. Some other participants declined to be interviewed formally but agreed to answering informal questions by email or in person.

One critique of using an ANT perspective is the difficulty in determining which actants to follow (McLean and Hassard, 2004). In this thesis, this difficulty was perhaps not as great as it may have been owing to the small size of the gymnastics population in New Zealand. The small numbers made it less difficult to see where to follow as almost everyone knew everyone else and would suggest the same names, gymnasiums and competitions to investigate. There was often agreement about who and what was important and significant as the participants were used to the same people in their small world. At each training centre, there was usually direction provided about who and where to follow next. Participants would commonly suggest that I talk to a particular individual, until towards the end

of my research, the same names and gymnasiums kept coming up with whom I had already spoken or observed.

In some cases, it would be revealed that there was a competition or a trial coming up for the gymnasts, which would become the next step in the following process. In the competition environment, the following turned less to the gymnasts themselves and more to the gymnastics routines. The process by which physical routines were translated into numbers on a page which determine the rankings of the gymnasts was followed through several roles. At some competitions I simply attended as an observer, however if I could obtain access, as much as possible I tried to work as a volunteer helper at the results table at competitions. This allowed me to closely observe the exact judging process. This was enlarged upon through interviewing judges and administrators.

Aside from training centres and competitions, where the majority of the following was performed, the other sites that were followed were those directed by sports scientists. In several cases, these were laboratories inhabited by sports scientists that gymnasts may visit, at other times they were universities who would set up and administer various tests for the elite gymnasts.

Gymnastics was also followed through its paper trail which led not only to meetings and documents, but online where emails and websites were examined. Additionally, important events such as joint training sessions involving gymnasts from several clubs, or sessions which tested the gymnasts' abilities were also observed.

Reflections on the Following Process

When I began my research I was both an 'insider' and an 'outsider'. My background in gymnastics before coming to New Zealand consisted of competing in women's gymnastics in Australia and coaching women's gymnastics in Australia and the USA. In 2001 I first arrived in New Zealand and worked for nine months as a women's gymnastics coach. Additionally, my partner had been a previous New Zealand champion in men's gymnastics, a coach in women's, and also competed briefly in trampolining and therefore was well known around the country in gymnastics. From July 2003 – September 2007 I also held a position of board member of a large gymnastics club which competed in the disciplines of men's artistic, women's artistic, rhythmic and trampolining. From March 2004 – September 2006 I also worked as an assistant high performance coach in women's gymnastics. My status then at the beginning of my research, in 2005, was an insider within the tiny world of Christchurch women's artistic gymnastics, but was known only to the occasional person outside of this area.

The world of high performance is a tiny one that can be snobby and elitist. I consider it a fortuitous thing that I had been accepted into this community prior to beginning my research. As Grenfell and Rinehart (2003) found when investigating high performance figure skating, it can be very difficult to gain access to high performance athletes and training centres unless you already have some form of 'insider' status.

My own 'insider' status came about because, as described above, in 2001 and then 2004, 2005 and 2006, I worked as the assistant to one of the top high performance artistic gymnastics coaches in the country. Because I had gained acceptance with him, I was accepted as 'in' by most artistic high performance coaches. There was only one interview in which I gained a taste of the uphill battle my research would have been had I not already been 'in'. This interview was with a women's artistic coach who did not know my mentor very well nor knew that I worked as his assistant. This was the only interview I undertook in which I was greeted with hostility, with the coach assuming I knew nothing about gymnastics apart from negative media impressions. After one and a half hours of discussion, he had realised I was not an outsider and opened up further to me. However, I had to spend the initial 30 minutes convincing him that I was not a journalist there to criticise his programme. As the following chapter demonstrates, the amount of critical writing that has addressed gymnastics over the last two decades makes his reaction unsurprising. There has been considerable debate about the potential negative effects on children of the long hours of training that gymnastics demands.

At the beginning of my research within the other codes I had no such connections. I had never competed in rhythmic or aerobics and although I had dabbled in trampolining as a schoolchild, I had no associations with the sport in New Zealand. However, as a board member of a club which included rhythmic and trampolining, I found myself quickly learning about these codes and soon met the dominant personalities within them at coaching clinics or competitions. For both rhythmic gymnastics and trampolining, my 'home' region of Canterbury was very strong and I began to help and observe at the many competitions held in Canterbury. At various times, every high performance coach and high level judge in the sport came down to Canterbury and this allowed me to interview each person. Perhaps because I was a familiar 'helper' face around the competitions, I found all the coaches and judges extremely happy to talk to me. In many cases, I found coaches in particular treating me as a sympathetic ear willing to listen to the trials they had gone through as a coach in New Zealand. Through the combination of constantly being seen at competitions and through being interested in everything that went on in these codes, within two years of beginning my research I was known as a recognised person within these codes. This was confirmed by the fact that I was invited to participate on the national committees which ran these codes. I found these requests very problematic to negotiate. On one hand, I felt almost a duty and of course a great interest in using the knowledge

gained from my research to assist with running the sport. However, as at the time I had not yet completed my fieldwork, I felt it would be extremely problematic to become one of the decision makers in the very area I was examining. Therefore, I remained without any official position at the national level until 2009, when it was with great joy that I felt I had completed my fieldwork and was therefore able to take on a position at national level.

However, my 'insider' status inevitably led to ethical dilemmas. Although everybody in these communities was aware of my research and those I specifically interviewed and observed had signed consent for me to do so, I was often privy to information that was given to me because of my other roles in the sport than for research purposes. If this information was crucial, I asked if I could use it in my thesis and was mostly greeted with a positive response.

Aerobics was the only code in which I never became an 'insider' in the sport. One of the reasons for this was access to aerobics was far more difficult for me. While all the other codes had significant competitions in Canterbury, including the National Championships in 2006, the major clubs and competitions in aerobics all took place in Auckland. Although I made several trips to Auckland observing aerobics training and competitions and made particular trips to observe the Aerobics National Championships and other competitions in 2007 and 2009, I was not regularly present and visible in the way that I was with the other codes. Also, as a board member of a club that contained all the other codes, I was privy to all the correspondence regarding these codes, which I was not in aerobics.

I was also at times highly aware of the potential conflict of interest between being a board member of a gymnastics club and performing my research. However, not only was I a board member, but also a coach, an ex-gymnast, a volunteer helper, very occasionally a judge, and also occasionally, a competitor at Masters gymnastics competitions. Although this thesis is not an auto-ethnography, there is an element of the thesis that moves in that direction. Throughout the period of my fieldwork, I managed to acquire some lived experience of a great many of the roles of my participants. At times, this was unexpectedly useful. For example, as described in chapter seven, the rules of gymnastics can be highly complex and particularly, I soon discovered, in the code of rhythmic gymnastics, where there are so many variations on how the body and apparatus can move together. Therefore, I struggled to understand the rules and requirements of this code until I competed at a Masters gymnastics competition in rhythmic gymnastics. The experience of competing was the only thing that allowed me to fully comprehend the rules. Throughout the period of my research, I managed to compete in

women's artistic, men's artistic⁴, trampolining and rhythmic at Masters level. I wanted to compete in aerobics but was unable to find a coach or expert to teach me.

Law (1991, cited in McLean and Hassard, 2004) notes the difficulty of the researcher maintaining analytic distance as we take on the participants' positions and see the world through their constructs. After spending several days or a week immersed in a particular gymnasium, I found myself unquestioningly accepting the methods in that gymnasium as 'normal' and 'right' and therefore developing a critical stance towards other gymnasiums. There was one case this was particularly apparent. There was one gymnasium I was reluctant to visit because I had developed a bias against the coaches there. Other participants had tended to be highly critical of the coaches and so I was inadvertently influenced into also feeling critical. However, after a very long interview with the two head coaches, I found myself driving away with a completely changed mind, being convinced that these coaches were in fact more knowledgeable and impressive than others I had previously interviewed. However, the longer my fieldwork continued, the more aware I became of the huge range of perspectives and the lack of any particular perspective or system that results in a successful outcome, and therefore became increasingly less critical of any particular perspective or programme. Latour (1995) argues that we should learn from our participants, and in my case I am astonished at how much I have learnt from the participants given that due to my previous experience and research in the sport, I could not help but feel that I already knew a fair bit. Indeed, I began this research with a view that I had some idea of how high performance gymnastics should be run and organised, a view that has been completely turned to shreds. Instead, at times I began to feel completely overwhelmed with just how large the network of gymnastics is and how many actants can influence the process of success. At the conclusion of this research, one thing I now feel I can say with certainty is that achieving success in gymnastics in New Zealand is highly unpredictable.

One of the reasons for this feeling is that throughout the period of my research, the sport of gymnastics in New Zealand has proved remarkably unstable. As noted previously, as a sport it is somewhat unique in the way the rules are reviewed following each Olympic Games, meaning that the detailed operations of each competition change every four years. However, in the 2005 – 2008 period in which the majority of my fieldwork was undertaken, the changes to the sport in New Zealand were substantial. Throughout my fieldwork, the sport has experienced four different CEOs, with a fifth appointed in 2009. From the 1st January 2008, New Zealand Gymnastics (NZG) changed its name to Gymsports New Zealand (GSNZ) to reflect the combining of the five codes of gymnastics within the one organisation. As a result, at times the thesis shifts from referring to NZG to GSNZ, depending on

⁴ At the South Island Masters Games, women and men are invited to compete in any of the ten artistic apparatus, so many women choose to compete on the men's apparatus, as I did in 2004.

which time period I am referring to. While on one hand I could frame these changes as unique to the period of my research, the way participants referred back to events before my research period as changeable and uncertain convinced me that this is not the case, that instead, gymnastics seems to exist as an unstable and loose assemblage.

Generating a Description

The major part of this thesis consists of a “mere description” (Latour, 2005, p. 137) of gymnastics in New Zealand. Traditionally, in sociology, a description is seen as inadequate. ‘Theorising’ involves placing a framework, or explanation, on top of the description to explain the phenomena. Latour (2005) argues that if our goal in research is to produce accurate and true data in the way that scientific method does in the ‘hard’ sciences, adding an explanation to a description is in essence doctoring the evidence.

Within the description in this thesis are constant mentions of participants in gymnastics in New Zealand. Of all the participants, 47 were given pseudonyms and are referred to by name, consisting of a range of gymnasts, coaches, judges and administrators from all five codes. Many of these participants were hybrids of these roles, with a large percentage having qualifications in judging and coaching as well as an administrative role. These 47 participants were those who agreed to be formally interviewed about their experiences in the sport, although there were many more participants who were only observed and spoken to informally. All those interviewed were invited to choose a pseudonym for themselves with about half doing so and the other half opting to have a random name chosen for them. The participants are also sometimes referred to by role, as for example a “trampolining coach”. In these cases, although there were many participants of hybrids, the participants tended to ‘switch hats’ depending on the topic at hand, and as such are referred to as the role of most relevance to the topic. Owing to the small size of gymnastics in New Zealand every effort has been made to assure the participants’ anonymity.

The description generated is without a doubt highly incomplete. As Law (1994) points out, a complete description is essentially an impossible dream as descriptions are limited by the inability of the research to follow all the networks simultaneously. In this thesis, it was impossible for a single researcher to observe 10 gymnasiums on a daily basis at the same time over several years. Even if this were possible, the descriptive account generated from such observations would be, as Latour (2005) cynically and humorously points out, beyond the scope of a PhD thesis⁵. In addition, gaining access to

⁵ See Latour’s famous discussion between the fictional student and supervisor where the supervisor states that in writing a description for his PhD, the student should “stop when you have written your 50,000 words or whatever is the format here, I always forget” (Latour, 2005, p. 148).

follow the network through all strands of the network would have proved highly difficult. For example, following how decisions are made regarding changes to the rules would have necessitated gaining access to the meetings between a small group of 'elite' members of the FIG in Moutier, Switzerland, which was beyond this research both in practical and financial terms.

The description attempts to give voice to multiple views. At times, the description is dominated by the words of the participants as they describe for themselves how and why they do things. However, in the case of non-humans, they cannot 'speak' for themselves, so in these cases a description based on observation is generated. Of course, such a description is, through necessity, interpreted by me as the researcher and can only be considered as an account of this nature. However, unlike a traditional sociological analysis, a pre-allocated interpretative framework is not utilised.

This thesis does not pretend to be an objective account that analyses every aspect of gymnastics training in New Zealand. It is a descriptive account of a messy world that tells a number of stories from a range of viewpoints about gymnastics in New Zealand. As such it connects with, but mostly differs from, existing accounts of gymnastics as described in the following chapter.

Thesis Overview

This thesis begins by mapping a range of ways gymnastics has been characterised. Chapter two notes how gymnastics, in particular women's artistic gymnastics, has become defined as the epitome of a 'child sport' with the potential to 'ruin' childhood. Next, this chapter focuses on sociologists who have used the work of Foucault to examine gymnastics training as a disciplinary practice through which power is invested in bodies. Gymnastics has also been framed as a feminine sport by both researchers and participants, with a number of its characteristics being firmly considered on the feminine side of the feminine/masculine dichotomy. Several authors have also been concerned with the judging scandals that have dogged gymnastics and investigated the reasons behind what have come to be framed as judging mistakes. Finally, as a sport in New Zealand, gymnastics is considered within the organisational structure of sport in New Zealand.

Chapter three examines the highly controversial and heavily debated practice of selection into the high performance stream. While all gymnasts in New Zealand can potentially enrol in gymnastics classes, not all gymnasts are permitted to compete in high performance. Instead, New Zealand has implemented various talent identification schemes to identify talented children for high performance. The primary form this has taken is a form of physical ability testing. This chapter follows the process of creating the tests, circulating them, mobilising gymnasts to take the tests, the actual taking of the tests, translating the test and circulating the test results. Other alternatives to the tests to undertake talent identification are also considered. Finally, this chapter examines how gymnasts who have been

selected for the international stream are then selected to be permitted to represent New Zealand at international competitions. Several cases with varied selection processes across several codes are described.

Chapter four focuses on the process of gymnastics training. This chapter considers the training hours of gymnasts in different codes, the format of training sessions and how time is organised, and how the more specific practices of conditioning training and choreographing routines take place. This chapter also pays attention to mediators that facilitate training, in particular the coach, and a range of non-human mediators. It draws on literature examining the position of the coach to explore the coach/athlete relationship and utilises observations from the sociology of time to understand the configuration of training.

Chapter five considers the use of non-gymnastics technologies in the training environment. The most commonly used technology was found to be the video camera, with almost all gymnasiums using it as a common part of the training practice. This chapter follows the type of camera set up used by different gymnasiums and pays attention to the explanations provided by participants for why it is perceived as useful. A case study of a new video camera system being introduced into a new gymnasium with several codes is then considered in detail.

Chapter six focuses on the use of non-gymnastics experts, mostly in the form of sports scientists, to enhance the training process. Gymnasts and coaches were found to primarily use four different methods of incorporating, or enrolling, the scientists into assisting them, while scientists were also found to enrol gymnasts to assist with their research. These different methods include the 'carding' process, voluntary enrolment by scientists, partial or one-off enrolment and a complete absence of enrolment.

Chapter seven unpacks the highly complicated and laborious process of gymnastics judging. In gymnastics magazines and online forums, judging is found to be the most debated topic, with gymnastics, coaches and spectators seldom agreeing on whether the judging was accurate, fair or correct. This chapter follows the judging process in careful detail, from the way that scores are written and collected, to how they are translated by judges and finalised. It also considers how the FIG has adopted the position of assuming judging to be problematic and introduced several measures in order to improve reliability.

Chapter eight examines the question of success in gymnastics in New Zealand. This chapter pays particular attention to the only highly successful athlete in New Zealand: Angela McMillan, the 2004 World Champion in Individual Women's Aerobics and how her history and training regime compares with other less successful gymnasts in New Zealand. This chapter begins by examining the difficulty

of identifying success, then notes some of the commonly held explanations for success. It then moves to examine the network of aerobics and how Angela has utilised this network to create success. It describes how the network of aerobics differs from the other codes through it being arguably 'easier, more popular for an older age group and through the organisational structure leaving aerobics less professionalised.

Chapters three to eight describe a range of accounts of gymnastics in New Zealand. Actants and the literature are both shown to describe particular models for how gymnastics should be organised and run with regard to training systems, selection systems, judging systems and organisational models. Throughout the thesis, actants and the literature are shown to debate and argue the effectiveness of these systems in producing successful high performance gymnastics. In contrast with other accounts of gymnastics, as described in chapter two, this thesis does not adopt a particular theoretical position in order to understand or explain the workings of gymnastics. Instead, in line with the goals of ANT, it is a descriptive account of the world of gymnastics which acknowledges the perspectives and positions of different participants, both human and non-human, and of academics and journalists. Put another way it explores the frames mobilised by the actants encountered in the course of the research.

Chapter 2

Commonly Circulating Controversies

There are certain aspects of the gymnastic codes that have led researchers to characterise these codes in particular ways. Many of these components are debated within gymnastics by participants as well as by external researchers. This chapter is a summary of ‘outsider’ accounts of gymnastics, predominantly by academics and journalists, many of whom have utilised sociologically traditional explanatory frameworks very different from the perspective used in the main body of this thesis in chapters three to eight.

The first section of this chapter examines the way in which women’s artistic gymnastics has been characterised as a problematic ‘child’ sport, potentially impinging on the rights of the child. Women’s artistic gymnastics is the code that has far and away received the greatest amount of academic and journalistic attention. As this chapter emphasises, the debate around whether high level gymnastics training is damaging for children commonly plays out with researchers and journalists external to the sport criticising its workings, and the athletes, coaches, judges and administrators involved in gymnastics defending it.

The second section moves from the work of journalists to academia in showing how several authors characterise the gymnast as an ideal example of Foucault’s “docile body” developed through the disciplined training in the institution of the gymnasium. Women’s gymnastics, rhythmic gymnastics, aerobics and mass gymnastics displays have all been examined through this lens.

The third section discusses the categorisation of artistic and rhythmic gymnastics as “feminine” sports. All codes of gymnastics, along with sports such as figure skating and synchronised swimming, are very commonly framed as feminine.

The fourth section notes how all the gymnastic codes are framed as potentially problematic and unfair due to the subjective judging system. Interestingly, unlike the framing of gymnastics as a problematic ‘child’ sport, this debate does not play out as external researchers acting as critics and internal workers as defenders, rather, the researchers are both internal and external to gymnastics. As chapter seven demonstrates, the participants in the codes are equally concerned about the creation of fairness within the sport, therefore the literature and research described in this section is not framed by participants as unreasonable but as important and significant.

The final section examines how success or the lack of success in gymnastics and other high performance sports in New Zealand is explained as the result of organisational structure. The organisational structures of NZG/GSNZ, and their relationship with gymnastics clubs and regional bodies is examined, along with detailing how high performance sport in New Zealand is structured through SPARC and the NZOC.

Women's Artistic Gymnastics as a "Child" Sport

“Chusovitina has defied conventional wisdom that gymnastics is a sport for teenagers. The only woman gymnast to appear at four Olympics, she has leaped over the age barrier...” (Kirschbaum, 2008, para. 10)

At the 2008 Olympic Games there were two prominent news stories surrounding the gymnastics competitions, both of which focused on the age of two successful gymnasts. The most scandalous was the accusation that the gold medallist on uneven bars, He Kexin, was younger than the allowed age to compete at the Olympic Games. The second celebrated the success of Oksana Chusovitina in winning her first individual Olympic medal at age 33, sixteen years after her first Olympic appearance in 1992. As described above by Kirschbaum (2008), Chusovitina was framed as an anomaly due to her age. The focus on the age of the gymnasts is not surprising, with women's gymnastics commonly perceived as a sport dominated by young children.

Over the last two decades, women's gymnastics has been criticised extensively for producing 'little girls' as successful athletes rather than adult women. In 1987, one of the earliest feminist accounts of sport that sat between a journalistic and critical feminist discourse, by Adrienne Blue, featured gymnastics. Blue entitled her chapter on gymnastics “The girls who don't want to grow up”, arguing that the legacy of famous gymnasts Olga Korbut and Nadia Comaneci has led to the sport being “tainted” and “dangerous to life and limb” with countless gymnasts developing anorexia to stave off puberty (Blue, 1987, p. 156). Blue (1987) compares the age of Korbut and Comaneci with the average age of the adult women gymnasts from previous decades, noting how previous gymnastic stars were in their mid-20s or 30s. As Kerr (2003, 2006) points out, the trend towards successful female gymnasts becoming younger began well before Korbut's appearance in 1972 but nonetheless the fame of Korbut and Comaneci has led to the belief in the lowered age of successful gymnastics as attributed to them becoming prominent (see for example Donnelly, 2004).

Arguably the most influential text produced on any type of gymnastics is focused around the idea introduced by Blue (1987) of women's gymnastics being a potentially damaging activity for children. Joan Ryan's (1995) *Little Girls in Pretty Boxes*, a journalistic chronicle of the lives of a number of gymnasts and figure skaters, proved popular enough to be produced as a movie in 1997 and has been cited heavily in academic work since (see for example, Grenfell and Rinehart, 2003; Johnson, 1997; Millar, 2002; O'Connor, 1997). Ryan focuses on gymnasts who have had negative experiences of elite women's artistic gymnastics. She argues that female gymnasts and figure skaters are put under immense pressure to train hard at a young age in order to be successful before reaching puberty, arguing that a female body becomes less effective at gymnastics after this point. Using over 100 interviews plus her observations Ryan details the lives of various gymnasts who deal with injuries, eating disorders, politics and pressure from parents and coaches (Ryan, 1995, p. 14). Ryan (1995) espouses the view of women's gymnastics as both physically and mentally damaging and calls for change in coaching and political practice.

Ryan's view was legitimised by the authority of medical discourse. Through the 1990s, several studies examining women's gymnastics were conducted and reached some damaging conclusions surrounding the intensive and lengthy training performed by gymnasts at a young age. For example, in 1996 the *New England Journal of Medicine* published an article entitled "Physical and Emotional Problems of Elite Female Gymnasts" (Tofler et al., 1996). The article focuses on the potential for inhibited growth and psychological damage that can result from the long hours of intensive training at a young age as experienced by many female artistic gymnasts. This article was followed by a number of further medical studies detailing health risks from participating in elite gymnastics training (see Caine et. al., 2001; Daly, Bass and Finch, 2001; Dresler et. al., 1997; O'Conner, Lewis and Boyd, 1996⁶).

Sports science and medical discourses about gymnastics tend to be in opposition to those of coaches or gymnasts. Coaches often adopt a defensive attitude towards external scientists and demonstrate frustration that medical discourses tend to be considered of higher value than their own. It would be possible to argue that coaches adopt the discourse of sports scientists due to both groups having identical goals of creating successful athletes. However, as is described in detail in chapter six, there is a profound difference in the way the two groups operate. The disjunction between these two positions is examined in New Zealand in chapter six.

⁶ According to these studies, gymnasts are at high risk of developing stunted growth, delayed puberty, eating disorders, psychological trauma as well as more 'standard' injuries such as broken bones.

Inspired by Ryan's work and the medical literature, several other academic works have placed gymnastics in a negative light, quoting heavily from these sources (see for example, Johnson, 1997; Millar, 2002; O'Connor, 1997). As a result of this criticism, some participants 'fought back' in defence of gymnastics. Betty Okino, a US National team member, was inspired to write a magazine article in defence of gymnastics and her coaches' training system in response to Ryan's work (Okino, 2001). Okino (2001) framed Ryan as an 'outsider' without the knowledge to understand the reality of gymnastics training. Okino (2001) argued that it is very easy for spectators such as Ryan to criticise the harshness of gymnastics training as they do not have to compete under immense pressure in the manner of an elite athlete⁷. Similarly, high level gymnastics coach and sports scientist Bill Sands produced an article in a gymnastics magazine in 1999 where he detailed the benefits of gymnastics. He discusses many of the possible problems in the sport as defined by Ryan, such as eating disorders and injuries, but cites academic studies in concluding that the incidence of these problems is no higher than in most high level sports (Sands, 1999a). Michel Leglise (1997), vice-president of the FIG and head of the FIG Medical Committee, produced a summary of the medical factors that affect gymnasts in his introductory statement for a medical symposium in 1997, where he focused on the lack of any long term damage sustained by gymnastics. These examples show how participants in gymnastics are aware of the criticisms of their sport and take deliberate steps to counteract them. This thesis shows how in New Zealand, participants in all codes draw on and debate these issues and consequently these ideas directly influence the way the gymnastics codes operate.

As both a medical professional and a member of the FIG Executive Committee, Michel Leglise has been particularly fervent in attempting to counteract gymnastics' negative associations. One of the central concerns which Leglise has attempted to address is the long hours trained at a young age and the consequent 'ruining' of childhood, as focused on by Ryan (1995). Ryan emphasises the issue of age and childhood by comparing gymnastics to other sports. She notes how unlike in the majority of sports, women's gymnasts reach the peak of their career during their teenage years, and explains this by arguing that a pre-pubescent body type has an advantage in women's gymnastics:

⁷ Betty Okino was coached by Bela Karolyi, arguably one of the most successful gymnastics coaches of all time. Karolyi coached Olympic Champions Nadia Comaneci (1st in 1976 and 2nd in 1980) and Mary Lou Retton (1st 1984) and World Champion Kim Zmeskal (1st 1991). He has long been a controversial figure in women's gymnastics owing to his forceful personality and huge success. Ryan (1995) singles out Karolyi as one of the worst of the abusive coaches in the USA, so Okino was strongly motivated to defend him and his methods. She described how it was only the hard training she went through that allowed her not to fall apart the moment she competed at the World Championships and Olympic Games.

These girls aren't allowed passage into adulthood. To survive in sports, they beat back puberty, desperate to stay small and thin, refusing to let their bodies grow up... The physical skills have become so demanding that only a body shaped like a missile... can excel. Breasts and hips slow the spins, lower the leaps and disrupt the clean, lean, body lines that judges reward. (Ryan, 1995, p. 7)

The FIG, led by Michel Leglise, responded to this concern by creating and then raising a minimum age for gymnasts. An age limit for women's gymnastics was first introduced in the mid 1990s and as of 2009 was set at a minimum of 16 years of age to compete at the Senior International, or Open level. In 2007, Leglise released the below figures demonstrating the large change in age that had resulted in women's gymnastics throughout this period as a result of the age restrictions:

| AGE AVERAGE WOMEN'S ARTISTIC COMPETITIONS 1994 - 2006 | | | | |
|---|----------------|-----------------|---------------|-------------|
| | | WAG Gymnasts | WOMEN's Ø AGE | MEN's Ø AGE |
| 1994 | Brisbane | 88 | 16.49 | 20.80 |
| 1995 | Sabae | 195 | 16.57 | 22.73 |
| 1996 | Puerto Rico | 96 | 17.13 | 22.42 |
| 1997 | Lausanne | 149 | 17.43 | 22.81 |
| 1999 | Tianjin | 260 | 16.85 | 21.94 |
| 2000 | Sydney | 98 | 17.58 | 21.30 |
| 2001 | Ghent | 172 | 17.72 | 21.85 |
| 2002 | Debrecen | 80 | 17.76 | 22.62 |
| 2003 | Anaheim | 223 | 17.37 | 22.71 |
| 2004 | Athens | 98 | 17.46 | 24.34 |
| 2005 | Melbourne | 95 | 18.27 | 22.19 |
| 2006 | Aarhus | 237 | 18.10 | 22.60 |

Table 2.1 Average age of women's artistic gymnasts at World and Olympic Competitions 1994 – 2006, Leglise (2007)

Although this table shows the arguably adult average age of 18 years in 2005 and 2006, the sport has difficulty escaping the criticism of being dominated by young girls. As noted earlier,

at the 2008 Olympic Games, one scandal centred on an accusation that the champion on uneven bars, China's He Kexin, was only 14 years of age, while 32 year old medallist Oksana Chusovitina was framed as an anomaly. The FIG and IOC determined that they had been supplied with sufficient evidence to prove He Kexin was 16 as required, however the allegation only confirmed the perception of gymnastics as a sport dominated by young girls.

Due to the long training hours required during adolescence in women's artistic gymnastics in order to reach their peak by around 18 years of age, issues around coping with school, training and peer relationships have also been of interest to researchers. Weiss (2000) contrasts gymnasts in the USA with other high school athletes. She highlights how gymnasts begin training at an unusually early age and often have their career peak during adolescence, rather than as an adult (Weiss, 2000, p. 191). She also observes that gymnastics tends to be a sport where training takes place at a private club, rather than as part of school culture, in great contrast to a sport such as American football (Weiss, 2000). Again in contrast to football, where the team are the "stars" of the school, gymnasts do not tend to gain great recognition from their high school (Weiss, 2000, p. 192). Donnelly's (1993) discussion of young high performance athletes, which examines family, coach and social relationships, educational, psychological and physical problems, politics and retirement, includes a disproportionately large sample of gymnasts who experience similar social problems as described by Weiss.

The assumption that the gymnast will have "problems" (Tofler et. al., 1996; Donnelly, 1993) as a result of their training is understandable when the number of training hours is considered. In New Zealand, gymnasts training towards a future in high performance are encouraged to train upwards of 20 hours per week from around age ten, with some coaches arguing that even this is not sufficient. One gymnast in New Zealand was training 32 hours per week at age eight, a schedule that coaches argue to be normal in the most successful gymnastics nations. This is a situation that coaches, parents and gymnasts do not agree on. As sociologist of childhood, Turmel (2008), points out, it is not considered acceptable in most Western societies for children to engage in this many hours of solid activity: "What children are supposed to do is play and learn" (Turmel, 2008, p. 54). This is confirmed by sociologists Grenfell and Rinehart (2003, p. 93) who, in examining figure skating, describe how children "need to play and move". The disciplined nature of gymnastics training is assumed to be far different from "play" and regarded as closer in nature to a type of work and viewed as unacceptable for young children, who are generally assumed to be better off with a "play" orientated childhood. Even sports where it is only teenagers, not pre-teens, training intensively, have been the target of criticism. For example, in Australia, the head of a talent search programme that identifies talented high school age children and seeks to channel them

into training intensively describes how her programme comes under immense criticism for taking “choice” away from children (cited in Green & Oakley, 2001, p. 259).

Donnelly (2004) cites the victory of 14 year old gymnast Nadia Comaneci in 1976 and the subsequent worldwide adoption of Eastern bloc training methods as setting off the trend towards intensive training at a young age. He describes how scientists noted the rewards to be achieved from talent identification and sport specialisation at an early age, but that by the early 1980s, commentators had begun to describe child high performance athletes as “child athletic workers” participating in “child labour” (Cantelon, 1981, cited in Donnelly, 2004, p. 312). Donnelly (2004) describes a long list of traits he believes to be shared by children in high performance programmes and child labourers⁸. Similarly, Grenfell and Rinehart (2003, p. 94) raise concerns about the immense psychological pressure placed on young high performance skaters by parents and coaches and question whether long training hours are the “appropriate physical prescription” for young children.

This thesis does not explore whether high performance gymnastics training acts as either a positive or negative contribution to a child’s development. However, it shows how the view that long training hours are a negative thing for children is one shared by many parents, and some coaches and administrators. For example, in one interview a coach was so determined to defend gymnastics against the notion of gymnastics producing unhealthy, apparently anorexic, children that he began his interview by saying:

...everyone thinks that gymnasts are anorexic and skinny and things like that but actually, we select by saying if you’re tall, you’re going to be a netball player, if you’re short, you’re going to be a gymnast. And I just wanted to clear that up at the beginning because people have that perception of gymnastics. (Liam)

The many hours of training are also introduced by participants as reasons for different levels of success by different athletes in different codes. In chapters four and eight, it is noted how each code includes a different training schedule and number of training hours. This thesis explores how these different training hours are believed to influence the success experienced by New Zealand gymnasts in these codes, the arrangement of clubs in offering these classes and on whether parents choose to enrol their children in these types of classes.

⁸ Donnelly (2004, p. 312) describes how children in high performance programmes: “are not permitted to be children, are denied important social contacts and experiences, are victims of disrupted family life, are exposed to excessive psychological and physiological stress, may experience impaired intellectual development, may become so involved with sport that they become detached from the larger society or face a type of abandonment on completion of their athletic careers”.

The Gymnasium as a Disciplinary Institution

Moving to purely academic accounts of gymnastics, several authors interested in competitive gymnastics and related forms of gymnastic movements, such as aerobics and mass gymnastic displays, have utilised the work of Foucault to examine these practices. These authors are also focused on the body, but they interpret the creation of the gymnast as the production of a docile body developed through the disciplinary regimes of surveillance and self monitoring, incorporating mechanisms such as the timetable.

One of Foucault's most influential and extensively utilised ideas is "Panopticism". Foucault (1991) was inspired by Jeremy Bentham's prison design of the "Panopticon", which consisted of a central tower looking out over the cell block/s where the inmates could be observed but unable to tell whether they were being observed at that moment. Foucault (1991) argued that the omnipresent gaze of the guards from the central tower creates an awareness from inmates of constant monitoring, causing inmates to regulate and discipline their own behaviour in line with the guards' expectations. The bodies are then rendered docile, a term Foucault (1991) used to refer to the detailed prescribing and then enactment of particular movements and behaviours.

Barker-Ruchti (2007) uses the work of Foucault to interpret the women's artistic gymnasium as a space designed for maximum surveillance of the gymnasts by coaches. She argues that equipment is often laid out in a manner to allow the coach to stand in one place and observe all the gymnasts under their care, with gymnasts rarely left unobserved. Similarly, in aerobics classes, Markula and Pringle (2006) describe how the aerobics class space usually consists of an enclosed room where all participants are lined up in rows facing a lone instructor who can observe every participant. In chapter four, many aspects of gymnastics training are examined with both surveillance and the physical properties of the equipment found to be influential in determining training practices. Similarly, in chapter seven, the unpacking of the process of judging reveals how the Code of Points dictates the way competitions are arranged to ensure the gymnasts are subjected to maximum surveillance by judges. This thesis highlights how these arrangements affect training and judging decisions.

Barker-Ruchti (2007, p. 197) further argues that the "tight and scanty training outfits" worn by the gymnasts allow the body to be highly visible to the observing coaches. She argues that the focus on the gymnast being seen and evaluated by judges means that training revolves around the gymnasts being looked at. Johns and Johns (2000) contrast gymnastics training

with that of long distance runners, where gymnasts are evaluated on what they look like and runners on the speed at which they run. As described in chapter five, in gymnastics the video camera is often introduced to assist with training because it allows a mediated version of seeing. Chapter six explores how sports scientists such as biomechanists also introduce computers that offer a further mediated method of seeing.

Also utilising the work of Foucault, Johns and Johns (2000) note how judges employ a range of techniques to insist on the gymnasts' subjugation. They describe how in rhythmic gymnastics, the judges insist on the gymnasts being extremely thin (Johns, 1998; Johns and Johns, 2000) and convey this message very directly, through informing gymnasts or coaches if they regard a gymnast as too heavy. They describe how whether a gymnast is the correct size is only based on the judges' opinions, yet the opinions influence their judging and consequently the competition rankings. Secondly, they note how at major competitions the judges repeatedly survey the training gymnasium in the days prior to the start of the competition. This allows the judges to learn which gymnasts are there and what movements they are performing for that particular competition. At these training practices, the gymnasts and coaches are highly aware of the surveillance and there have been incidents of gymnastics coaches using this situation to call attention to their own team. This may take the form of gymnasts showing off very difficult elements that they can perform with the aim of influencing the judges to think they are better than they really are or by doing something dramatic to call attention to a new unknown gymnast or team (for example, coach Bela Karolyi introduced Nadia Comaneci in a dramatic fashion as described in Comaneci, 2004, p. 41⁹). Barker-Ruchti (2007) and Johns and Johns (2000) argue that the constant presence of the judging gaze encourages gymnasts to internalise this gaze, continually monitor themselves, and they argue, modify their behaviour and dress.

Barker-Ruchti (2007) argues that in the training environment, gymnasts are taught to self monitor themselves and their training, an effect Collins (2002) also observes and interprets as occurring in aerobics classes. Using the work of Foucault, both authors argue that gymnasts and/or aerobics participants come to recognise the necessity of their own disciplined training and therefore are said to submit to disciplinary techniques led by coaches and judges, drawing on what Foucault refers to as "automatic docility" (Cole, Giardina and Andrews, 2004).

Barker-Ruchti (2007), Johns (1998) and Johns and Johns (2000) describe the monitoring of

⁹ Bela Karolyi, the high profile coach of Nadia Comaneci, described how at the 1976 Olympic Games, he manipulated the late arrival of the Romanian team into the first training session in order to ensure that all eyes were on the Romanian team. Prior to the 1976 Games, Romania was not considered a team worth watching, so Karolyi argued he had to draw attention to his team to ensure they were awarded the marks they deserved.

the body by gymnasts as a form of disciplining of their eating practices. Johns and Johns (2000) describe how their study revealed that successful gymnasts applied what they referred to as technologies of the self in the form of dietary practices. They argued that this has had the effect of regulating their bodies to comply with expectations of the judges, who are believed to reward a thin body with higher scores.

Barker-Ruchti (2007) interprets the gymnastics training process as creating docile bodies through the performance of constant repetitions of particular exercises. In all codes, gymnastics training involves a progressive system where the gymnasts first learn simple elements and gradually move towards more difficult skills. Through this process, the gymnasts' bodies are continually trained to move in particular ways. Barker-Ruchti (2007) describes how women's artistic gymnasts were disciplined to hold their bodies tight, with straight legs and pointed toes, and gradually learnt particular movements associated with each apparatus. Chisholm (2005) used the same Foucauldian argument in her analysis of gymnastics in North America in the late nineteenth century to argue that the callisthenic exercises performed produced docile bodies; bodies which compliantly move and behave in particular, learnt and designated ways.

Roubal (2003) draws on the work of Foucault to analyse mass gymnastics. He argues that these displays could be considered the "highest form of disciplinary practice" (Roubal, 2003, p. 10) because of the perfectly formed bodies and lines in the stadium. He describes:

Not only did the gymnasts perform the same movements at exactly the same time, at exactly the same speed, but their discipline had aesthetic aspirations and quality.
(Roubal, 2003, p. 10)

While this thesis does not examine non-competitive gymnastics, it does examine three types of competitive gymnastics that incorporate the desire for synchronisation as Roubal (2003) describes: the group competition in rhythmic gymnastics and aerobics, and the synchronised trampolining competition. In all these forms, the Code of Points dictates that the bodies should move in perfect harmony and synchronicity whilst also demonstrating artistry in their movements. This thesis describes how training is structured with the goal of meeting these requirements.

Foucault observed that controlling the activities within a specific space, such as within a gymnasium, is most effectively achieved through the use of a timetable (Foucault, 1991; Markula and Pringle, 2006). The timetable regulates the use of space, creates repetitive cycles and ensures maximum use of the time available. This observation by Foucault is seized upon

by Markula and Pringle (2006) who observe the use of the timetable in the fitness gymnasium. They argue that Foucault's observation can be used to shed light on the way aerobics and other fitness classes operate in ensuring maximum use of spaces that cannot be used by multiple groups at one time. They describe the aerobics classes they observe to be mostly one hour in length, with some 30 minutes or 1.5 hours, with the differing lengths making the creation of the timetable more challenging. Markula and Pringle (2006, p. 77) further observe how within each class, the limited time is broken down further into smaller segments in the form of "warm up, activity, cool down".

As is described in more detail in chapters four and five, gymnastics classes are organised in a similar way. Gymnastics classes follow the same rough format of fitness classes of 'warm up, activity, cool down'. Further, most gymnasiums have more than one class or group operating at a time, often with a large number of classes spread over a wide variety of spaces. This is particularly relevant in artistic gymnastics, where four or six apparatus are used at a time, and groups of gymnasts carefully timetabled to use all these apparatus.

Although the work of Foucault is not specifically addressed in this thesis, Kendall and Michael (2001) argue that the work of Latour extends the work of Foucault. They argue that the English word "technology" which has become the common translation for the French word "technique" as used by Foucault, is problematic. They argue that Foucault's phrase "technologies of the self" (Foucault, 1986) should be translated as "techniques of the self" owing to the fact that Foucault was not primarily interested in technologies. Instead, the self for Foucault was "purely human and purely social" (Kendall and Michael, 2001, para. 16). Kendall and Michael argue that Latour's view of the self as an assemblage of the human and non-human, incorporating technologies, extends the "purely social" that was of interest to Foucault. As Law (1992, p. 105) notes, ANT could not exist without the work of Foucault preceding it, as ANT relies on building upon "its lessons about the continuity of structure and agency, the formation of agency, the material nature of the social, and the ubiquitous character of power". As this thesis demonstrates, ANT is equally interested in power relations and each chapter reveals particular arrangements of networks which describe the workings of power.

It is also found that gymnastics participants often adopt positions that confirm some of Foucault's ideas. For example, the gymnasium is often laid out to ensure that the coach can achieve maximum surveillance of all the gymnasts in their domain. Also, as shown in chapter three, some of the Foucauldian interpretations made by Barker-Ruchti (2007) are contested and challenged by gymnastics participants in New Zealand.

Gymnastics as a ‘Feminine’ Sport

“The answer to sexual alchemy was supposed to be gymnastics. A feminine sport. Gymnasts are girls, not tomboys.” (Blue 1987, p. 155)

As this quote by Blue describes, gymnastics has been categorised as a feminine sport. There are a number of dimensions to this categorisation, and various aspects are drawn upon by internal participants as well as external writers in defining it this way.

Varney (2002) uses a historical basis for defining gymnastics as a “feminine” sport. Through examining the history of the sport, she argues that women’s artistic gymnastics was specifically designed for women in opposition to the previously established traditions of men’s gymnastics.

Men’s gymnastics is one of the oldest Olympic sports, with male gymnasts competing at every modern Olympic Games. Gymnastics has a long history as a non-competitive activity, with apparatus such as the pommel horse argued to have been used in the training of Roman soldiers during the pre-Christian era (Varney, 2002).

Competitive men’s artistic gymnastics in today’s form began to take shape during the latter half of the nineteenth century. During this period, it had become a widespread practice in Europe for men to perform gymnastic type elements on apparatus such as the parallel bars and vaulting horse in order to develop the fitness and discipline required to be an effective soldier. The German nationalist pedagogical reformer, Friedrich Ludwig Jahn, is credited with being influential in this process, and for inventing the pommel horse, parallel bars and high bar (Liponski, 1999; Varney, 2002). Jahn believed that the physique and skills learnt through these exercises would be hugely beneficial in creating effective soldiers (Huguenin, 1981). The competitive form of men’s gymnastics developed primarily from these military roots. In the late nineteenth century, a variety of different types of gymnastics competitions and exhibitions took place in Europe which included both movements developed by Jahn and related activities such as climbing and weight lifting (FIG, 1991). By the 1920s and 30s men’s gymnastics had become widely practised throughout Europe as both a competitive sport and a disciplined activity to increase moral values and health (Liponski, 1999).

In Europe and North America, women began to take an interest in men’s gymnastics in the 1880s. However, it was argued that the apparatus required strength beyond that commonly possessed by the female body (Sands and Conklin, 1984). Perhaps more influentially, societal pressure regarded such activity as unfit for a female, a belief which continued for a number of

years (Prestige, 1979; Sands and Conklin, 1984). Medical research advocated that such activities would cause harm to the female body (Hargreaves, 1994). Women were instead encouraged to perform a different style of gymnastic movement considered more fitting, comprising of exhibitions of folkdance and ballet, in Belgium, Luxembourg, Germany and central Europe (FIG, 1991). Towards the end of the century, women in both Europe and North America practised a combination of rhythmic gymnastic and callisthenic style movements as exhibited in 1904 when women made their Olympic gymnastic debut. At this event, they participated in a non-competitive exhibition, wearing long skirts and high collars whilst performing field exercises with wands and barbells (Goodbody, 1982; Levy, 1998). This callisthenic style of gymnastics remained highly popular during the 1920s and 30s although opposition to competitive Olympic gymnastics from the FIG and International Olympic Committee (IOC) still persisted on the grounds that acrobatic and apparatus type work as seen in men's artistic gymnastics at the time was unsuitable for the female physique (Hargreaves, 1994). In 1928, women again appeared at the Olympics, this time in an experimental competition that included vault in the style of men's gymnastics together with group exercises with portable apparatus such as clubs, cane and ropes (FIG, 1991). Two world championships took place in 1934 and 1936 where women used a combination of hand held apparatus and men's apparatus, and in 1952 the women's artistic gymnastics competition was added to the Olympic programme in the four apparatus format of today.

Varney (2002) argues that the four apparatus format of women's artistic gymnastics confirms how the sport was created in a largely gendered manner. She describes how the FIG and IOC excluded women from competing on the male apparatus of pommel horse, rings and parallel bars and instead allocated the more apparently 'feminine appropriate' apparatus of balance beam and uneven bars. The prevalent ideas from the late nineteenth century that men's apparatus required too much strength for females, may cause medical harm and were socially unacceptable, were used to decide the form competitive women's gymnastics should take. The FIG and IOC considered the uneven bars to require far less strength than parallel bars, and allowed women to pause, pose and rest on the bars throughout routines. Similarly, the balance beam was developed as purely a balance exercise, an alternative to the more 'difficult' apparatus that the men used. The purpose was to show the performer "balanced high on her slim pedestal, in all her feminine charm and elegance" (Prestige, 1979, p. 49).

While the men's apparatus, floor and vault, were considered acceptable for women to use, the requirements were altered for women. On floor exercise, a music accompaniment and the expectation of dance work and choreography were added, while on vault, the vault was placed sideways, rather than long-ways as for men (Varney, 2002). The resultant four apparatus

programme required women to perform attractive, dance-like, constrained and expressive movements, quite different from the strength and power orientated movements required of the men. Women's gymnastics in this form met with the approval of Avery Brundage, IOC President at the time, who advocated that women should only be permitted to compete in what he perceived to be 'feminine appropriate' sports (Hargreaves, 1994).

In the 1970s, women's gymnastics was rocketed to worldwide fame and popularity by the eye-catching performances of Olga Korbut and Nadia Comaneci at the 1972 and 1976 Olympic Games, which were televised widely. This created huge interest in women's gymnastics, so much so that it became more popular than men's gymnastics, leading to gymnastics being associated with females more than males. It is this period that provoked the majority of feminist writings that discuss gymnastics to describe it as the epitome of a "feminine" sport (Blue, 1987; Cahn, 1994; Kane and Greendorfer, 1994; Levy, 1998; Lenskyj, 1986; Ryan, 1995). Numerous qualities have been associated with the sport and its "feminine" connotations, including weakness, passivity, responsiveness, beauty, aesthetics, dependence, nurturance, fragility, grace, expressiveness and flexibility (See for example Brenner, 2002; Creedon, 1994; Gilbert, 2001; Gilroy, 1997; Kane and Greendorfer, 1994; Lenskyj, 1986; Theberge, 1997).

In these discussions, there is recognition of the contribution of both television and print media in creating a perception of gymnastics as feminine. It is argued that gymnastics and figure skating are both represented as female or feminine sports for a number of reasons. Firstly, both newspaper and television coverage concentrates on the female rather than male athletes during the reporting of these two sports (Koivula, 1999). Secondly, women are reported to watch these sports on television more than men do (Koivula, 1999). Finally, it is easier for both television and print media to find images of women who appear graceful and attractive, a traditional feminine trait, in these sports because aesthetics forms part of the judging criteria (Daddario, 1998; Whannel, 1992).

Bryson (1994) observes that sports that are characterised as feminine often include components that are valued as less skilful than those in traditional sports. For example, he describes how the strength, skill and endurance of the male ballet dancer are not applauded to the same degree as the skill of the football player, due to ballet's feminine associations. The lack of acknowledgement for balletic skills becomes highly apparent through examination of the most supposedly feminine code of gymnastics: rhythmic gymnastics.

As Varney (2002) observes, although she argues women's artistic gymnastics was created as feminine, rhythmic gymnastics in fact fits this characterisation more effectively. While artistic gymnastics requires some traditionally masculine traits such as strength and fearlessness, rhythmic gymnastics has no aspects that would traditionally be interpreted as masculine. Instead, rhythmic revolves around the gymnast expressing themselves to music in all routines. Cahn (1994, p. 217) describes how rhythmic gymnastics has been categorised as feminine because of "the assumption that some sports are inherently and incontrovertibly masculine or feminine". Rhythmic incorporates a number of traits that are generally interpreted as feminine, as described below, including a history which includes the deliberate creation of sport that would be "more feminine" (Huguenin, 1981, p. 111) than artistic gymnastics.

In the 1960s, a committee broke away from the Women's Artistic Gymnastics Technical Committee¹⁰ in order to create rhythmic gymnastics. This all female committee rejected artistic gymnastics and set out to create a form of gymnastics that incorporated a team or group dimension and that would be "more feminine, more collective, better adapted to all women and especially less acrobatic" (Huguenin, 1981, p. 111).

Harking back to the gymnastics style exhibitions performed by women in central Europe in the late nineteenth century, a four event programme for rhythmic gymnastics was decided at a festival in Bulgaria in 1962. The programme included ball, hoop, rope and freehand. Several of these apparatus were similar or identical to those used by women at the Olympic Games in 1904 and 1928. The programme was fine-tuned for the first world championships in 1963 and continued to be altered over the next decade and beyond (Huguenin, 1981), before reaching its current form of a four event programme where the five apparatuses rope, hoop, ball, clubs and ribbon are rotated and competitors compete both individually and in groups of five. The sport has remained female only, not only with all female competitors but until recently, exclusively administrated by women. In ensuring rhythmic was "more feminine" and "less acrobatic" (Huguenin, 1981, p. 111) the requirements included the display of a number of traits that are generally categorised as feminine, including expressiveness, grace and flexibility.

In New Zealand, Kerr (2008) notes rhythmic gymnastics is considered somewhat inferior to artistic gymnastics. Rhythmic participants often feel they are looked down upon by those involved in artistic gymnastics. Similarly, both artistic and rhythmic gymnastics suffer from comparison with the far more popular female-only sport of netball. Not unlike netball,

¹⁰The International Gymnastics Federation Technical Committees are made up of individuals from a variety of countries and they are in essence in 'charge' of the sport, making all decisions regarding the rules and regulations.

regarded as the national women's sport in New Zealand, rhythmic gymnastics is argued to have flourished because it provided a space for women to play that was separate from men and men's sport (Nauright, 1996; Taylor, 2001; Treagus, 2005)¹¹. In recent times netball is described as increasingly vigorous, fast and skilful (Treagus, 2005) and therefore more difficult to categorise as strictly feminine. While rhythmic gymnastics is commonly described as highly feminine in the sense that participants display traits such as flexibility and artistic expression that are argued to belong on the traditionally feminine side of the feminine/masculine dichotomy, successful netballers today are increasingly strong and muscular. The game of netball today is argued to combine an increased physicality, strength, determination and competitiveness with grace, co-operation and femininity (Taylor, 2001). While research has shown that females who play rugby or soccer feel the need to engage in so-called hyper feminine practices to demonstrate their femininity (Chu, 2003; Cox and Thompson, 2000), netballers appear to be accepted as females who appear feminine as well as being respected for their athletic prowess. The game is described as incorporating athletic traits for which netballers are respected, but not so much athleticism that their femininity is called into question. Krane (2001, p. 122) argues that female athletes must walk a "fine line" between a muscular and "acceptable" appearance. On one hand, they develop muscular physiques to be successful in sport, but on the other, are also expected to conform to heterosexual norms in displaying beauty and grace (Krane, 2001). In New Zealand, female netballers are said to walk this "fine line" very effectively (Kerr, 2008). By contrast, rhythmic gymnasts are considered too feminine and therefore not "real" athletes.

The idea of rhythmic as not a 'real' sport is confirmed by Cahn (1994), who describes how throughout the twentieth century, 'real' sports and real athletes have been defined as masculine, emphasising strength and aggression as important traits for success. Krane (2001) gives a number of examples of female athletes who are not treated as 'real' athletes because they appear to be "too feminine". She describes:

¹¹ Historically, netball began as a women's version of basketball (Nauright, 1996; Thompson, 2003; Treagus, 2005), but rather than being seen as a male sport that had been modified for women, proponents of the sport promoted it as a sport specifically designed for females where 'masculine' traits such as aggression were replaced by an emphasis on teamwork (Treagus, 2005). The rules included restraining players to particular sections of the court so they did not exhaust themselves and prohibiting players from "snatching" the ball out of the opponents' hand to avoid unladylike behaviour (Treagus, 2005, p. 92). It was also defined as a non contact sport, where the skills were relatively simple and the playing attire decorous (Jobling and Barham, 1991). These elements resulted in the sport being seen as appropriate for women by many men as well as women, and considered acceptable as early as 1900 (Nauright, 1996; Treagus, 2005). It has also been argued that netball prospered because it was almost completely administered and controlled by women (Nauright, 1996; Treagus, 2005). As a sport that did not compete with men for space nor challenge dominant constructions of masculinity or femininity, netball flourished in New Zealand (Thompson, 2003).

Upon achieving a feminine appearance, women in sport are then sexualised, trivialised, and devalued. Feminine sportswomen are not taken seriously, they are seen as objects to be gawked at (i.e., sexualised) or made fun of (i.e., trivialised)... Though society emphasises the need for women to be feminine, to do so results in marginalised treatment, thus creating a cycle of discord. (Krane, 2001, p. 122)

Using Krane's (2001) argument, the absence of traditionally masculine traits and the display of femininity in rhythmic gymnastics can work to encourage outsiders to perceive the sport as not a 'real' or serious sport. This perception was espoused in an internet chat room in 2004 around the topic of "What Olympic events do you think are rather silly?" This featured rhythmic gymnastics and synchronised swimming ahead of any other sports. Members of the discussion commented (JREF Forum, 2004, para. 1):

I have a couple that make me wonder.....Synchronised Swimming.....and that thing where the woman rolls around on the mat, clenching her buttocks and waving a stick with a ribbon on it.

You know, the moment I saw the title of the thread I thought 'Rhythmic Gymnastics'.

Couldn't agree more, anything that involves poncing about in make-up can hardly be called a sport.

I think it's the only "sport" where drugs are obligatory.....For the spectators!☺

The third comment here highlights how it is the presence of the traditionally feminine practice of wearing make-up that makes the sport's legitimacy questionable. The athletes, coaches and administrators of rhythmic gymnastics are aware of comments like these. For example, in a magazine interview in 2007, the top American rhythmic gymnast stated: "I think the public thinks a lot of the time that it's just a girl dancing around with a Hula Hoop" (Crumlish, 2007, para. 21). As discussed later in this thesis, the participants in this thesis make similar comments.

Grindstaff and West (2006) found that competitive cheerleaders were similarly frustrated by the lack of recognition of their sport. Like cheerleaders, rhythmic gymnasts appear to be marginalised not only because of the sport's obscurity, but because the sport retains many supposedly feminine elements that compromise its legitimacy (Grindstaff and West, 2006).

In the early 1990s, Feder (1994) showed how female ice skaters faced similar disregard. Feder (1994) noted how the emphasis on beauty was one of the main reasons why ice skating gained such high television ratings, yet despite this, the sport was not taken seriously. She quotes one columnist (Lincicome, 1992, p. 1, cited in Feder, 1994, p. 65) who pronounced:

Figure skating-should be dropped altogether. What used to be a genuine competition is now what Cats' is to musical comedy, a costumed, overwrought, pretentious joke. And what kind of game is it where the winner gets to wear cosmetics and skate on tour?

One component that rhythmic gymnastics, figure skating and cheerleading share is an emphasis on dance. In rhythmic, this takes the form of many movements being highly influenced by ballet. Among many other movements, both rhythmic gymnastics and ballet dancers perform jetés (leaps), pirouettes or pivots (turns) and balances which require immense flexibility. Bryson (1994) notes how ballet is considered to be on the feminine side of the feminine/masculine dichotomy. McCarren (1998, p. 3) argues that ballet is often not appreciated due to a perceived association with ballet as “essentialised femininity”. Using these arguments, it follows that this same lack of appreciation for dance and ballet is extended to rhythmic gymnastics, figure skating and cheerleading.

Rhythmic gymnasts could perhaps be seen to be ‘real’ athletes if, like netballers in New Zealand, they sported visible muscles and an athletic build, but the flexibility requirements of the sport mean that doing so would negate their rhythmic gymnastic skill. Sports such as rugby or soccer involve the athletes needing to be strong and fast and are difficult to succeed at unless one develops a muscular physique. In Western society, while the acquisition of strength and muscles has generally been seen as empowering for men, it has been seen to be less valuable for women (Hargreaves, 1994). Women instead have been denigrated for possessing a muscular body (Krane, 2001; Obel, 1996). Therefore, many women involved in sport face the contradictory pressure to look like a woman socially, but to have an athletic body to perform in sport. Throughout the late 20th century, tension has existed for women in sport between the two contradictory ideals of femininity and athleticism (Messner, 2001; Schneider, 2000).

By contrast, in rhythmic gymnastics, the body produced from doing the sport and the body required for performing the sport at the top level conforms closely to contemporary female fashion requirements. The ideal body, according to current standards of fashion, is one which is thin but toned, though not muscular (Brace-Goven, 2002; Krane et. al., 2004). As Kerr (2008) describes, rhythmic gymnasts agree that this is precisely the type of body that would

be 'right' for rhythmic gymnastics. For example, when asked: "Is there a particular body type that's perfect for rhythmic?" these gymnasts replied:

Gymnast 1: Oh, really skinny but not too skinny so they gross me out. And I really like the Italian group. They've got really nice abs and stuff. Some of the really, really skinny ones I think they're too skinny so they don't really have muscle. But I really like that group, they're really toned, but really skinny with long legs.

Gymnast 2: Long and lean.

Gymnast 3: ...pretty much really skinny!

Gymnast 4: I imagine the perfect rhythmic person being like tall and slim.

Gymnast 5: They need to be like flexible, not too muscular... more lean, slim muscles. Still very strong, but slim. (Kerr, 2008, p. 105)

These rhythmic gymnasts emphasise that although their bodies need to be strong, muscles should not be overly visible and should definitely not overshadow the appearance of slimness. Rhythmic gymnasts develop long, lean, thin bodies because of the emphasis on flexibility in the sport. As the gymnasts practise flexibility, their muscles lengthen rather than bulk, giving the gymnasts a long thin look. This emphasis on a thin body means that rhythmic gymnasts do not experience the contradiction of needing an athletic body for sport and a feminine body for social acceptance that so many female athletes experience (Krane, 2001).

While a number of authors identify both women's artistic gymnastics and rhythmic as feminine, so too do a number of the participants in this sport. This thesis shows how rhythmic coaches had a tendency to explain the attraction of rhythmic gymnastics in terms of its feminine traits. By contrast, the gymnasts tended to be more specific in referring to details about the sport that they enjoyed, such as the ballet style movement, or playing with the equipment.

Participants in gymnastics have also criticised the categorisation of the sport as feminine. For example, in 1996, American gymnast Kerri Strug rocketed to prominence after she attempted and landed her final vault on a heavily injured ankle. In her autobiography, Strug complained that there was a double standard, that in American football, the men were supposed to behave this way, but she, a gymnast in the supposedly feminine sport of gymnastics, was not (Strug and Lopez, 1997). Vecsey (1996c cited in Chisholm, 1999, p. 129) argued that the media

struggled with how to present Strug, as on one hand Strug was cast as a great American hero but on the other as a delicate, feminine child.

One of the most controversial debates in gymnastics has also been incorporated into challenging the categorisation of the sport as feminine. As previously noted in chapter one, gymnastics participants all around the world enjoy debating the constant rule changes in the code on message boards, blogs and in magazines. In a reflection of this debate, Wilson (1996) notes that women's artistic gymnastics has evolved to become less artistic than at its inception, and argues that spectators find more spectacular, high flying performances easier to appreciate than artistic ones. In being more spectacular, risky and requiring more strength, the sport no longer conforms to traditional feminine ideals. In framing changes by black boxing them as feminine or masculine, the details and impact of changes in requirements and expectations is left unexplored. This thesis aims to explore and describe these details, and shows that rule changes that may appear small can have a significant effect on the way training and competitions operate. Further, many participants of gymnastics are highly aware of critiques of the rules and policies, and challenge and debate them as part of participating in the sport.

Gymnastics as a Subjective Sport

“Gymnastics, like ice dancing, has one problem, and it is insurmountable. As the gymnasts can never be perfect, nor can the judges.” (Baum, 2005, p. 9)

As the above quote by Baum (2005) describes, there is a perception that the evaluation systems for all codes of gymnastics are immensely problematic as they rely on humans interpreting the routines. As described in chapter seven, a common position adopted by coaches, gymnasts and administrators is to assume that all judges are open to corruption or mistakes, making judges essentially unreliable. This is also the position adopted by the FIG who, as chapter seven describes, are continually introducing new technologies with the goal of improving the quality of judging.

A number of studies have been carried out with the aim of investigating the level of unreliability in judging in gymnastics. Several of these studies begin with the assumption that judges are open to corruption and bias, and will generally judge in favour of particular gymnasts if they can. These studies on judging have found evidence of nationalistic bias (Ansoorge and Sheer, 1988; Dixon, 2003; Ružena, 2000), bias through expectations of success (Findlay and Ste-Marie, 2004; O'Brien, 1991) and evidence of genuine mistakes (Ste-Marie et al., 2001).

Ansorge and Sheer (1988), in their study of the women's gymnastics competition at the 1984 Olympic Games, determined that bias exists in two primary forms. Firstly, judges over-score gymnasts from their own countries, and secondly, judges underscore gymnasts from countries in close competition with their own. Montgomery (1989) examined the same question within men's gymnastics, and came to an identical conclusion. Ruzena (2000) found evidence of over-scoring of gymnasts from their own countries in rhythmic gymnastics.

Fink (1985) chose to examine a different aspect of judging, concentrating on the process of judging itself. He identified a number of factors such as the complexity of the rules, high task demand and internal and external pressure, which may inadvertently cause judges to perform inadequately. He concluded that the pressures on judges are extremely high, and make it very difficult for judges to judge in an objective and accurate manner.

Green and Allen's (1984) discussion on judging is perhaps the most contentious. In their article, a number of high level coaches, judges and administrators were interviewed. Several openly admitted to the existence of deal making within gymnastics. One administrator claimed that it is necessary to play politics in order to win, arguing that it is stupid not to. This article explains how the 'wheeling and dealing' system has come to work. Deals are made between nations where the judge on one apparatus will score another country just a tiny bit higher if a judge from that country does the same. Historically, alliances were made between Eastern and Western bloc nations. This article also discusses the problem with star athletes being judged generously due to their reputation. In the conclusion, the authors observe that the FIG did not suspend judges involved in deal-making as these judges generally had very close ties with the FIG (Green and Allen, 1984). However, the situation appears to be changing since the time of Green and Allen's research as in both the 2000 and 2004 Olympic Games, judges have been suspended by the FIG (Anon, 2002; FIG, 2004).

In chapter seven of this thesis, the process of judging and the new components introduced by the FIG to attempt to counter errors are examined in far more detail. The idea of subjective judging as problematic is found to be of concern to the FIG with numerous 'solutions' offered to improve the quality of judging. This thesis also describes how judging is keenly debated by almost all gymnastics participants, who often disagree on the outcome of gymnastics competitions.

From “New Zealand Gymnastics” to “GymSports New Zealand”

Another controversy within New Zealand gymnastics is how gymnastics should be organised in New Zealand. There is debate between numerous organisations including the national gymnastics body, SPARC, the NZOC and private gymnastics clubs around what policies should be enacted and by whom. The structure of these organisations and their relationship with each other is seen by many authors as key to influencing the workings of the sport in New Zealand. As described below, in 2008 the national gymnastics body was completely restructured. The organisers of the national body adopted the position that changing the structure of the organisation would be highly influential to the production of success. A range of academic authors adopt this position.

In her comparison of the organisational structures of six different national sporting federations for artistic gymnastics, D’Amico (2000) concludes that in all the countries studied, regulations and written policies can have a significant impact in producing success. However, she also acknowledges a wide range of other factors that contribute to success. Collins (2008) and Dyer (2006) identify some of these as: talent identification and development, coaching, sports science and medicine, competition opportunities, supporting emergence of full-time athletes and facilities (Collins, 2008; Dyer, 2006). Many of these factors are examined throughout this thesis, with chapter eight focusing specifically on the notion of success.

One factor that is often argued to contribute to a country’s success in sport is the level of government intervention. Historically in New Zealand, government involvement in sport was perceived by many New Zealanders as “inappropriate interference” and generally undesirable (Collins, 2007, p. 210). Collins (2007) notes, however, that government involvement has increased significantly in the last decade with possible motivations for this including the maintenance of public order, overall fitness and health of the population, and the quest for national prestige. He defines the governing bodies for sport in New Zealand as “quangos”: quasi government agencies given a mandate to foster sport by the central government (Collins, 2007, p. 210 – 211).

From the late 1980s until 2002, New Zealand was governed by three separate quangos: the Hillary Commission, New Zealand Sports Foundation and Office of Tourism and Sport (Hindson, 2006). In 2002, these bodies were disbanded and SPARC was established as the country’s main provider of sport, marking a substantial shift in the sport landscape in New Zealand with more direct government involvement (Collins, 2008). Where previously each of the three quangos had different objectives and goals, SPARC was designed as a “one-stop-

shop for sport support and funding” (Collins, 2007, p. 218) and hoped to attract a greater level of government funding.

SPARC created three objectives, one of which included the support of high performance sport.¹² Clear targets and plans were set for high performance sports and athletes which allowed SPARC to take the view of allocating funding based on potential return on their investment, in the form of medals (Collins, 2008; Collins, 2007). A strong corporatised style of management has been adopted by SPARC, with policies created with the aim of protecting “investment and achieving high performance success” (Collins, 2007, p. 224).

SPARC consists of a number of units, one of which is the High Performance Unit (HPU) responsible for the development and delivery of high performance sport policy. The HPU works directly with each National Sporting Organisation (NSO) to improve high performance plans and programmes, and directs investment through both the NSOs and the high performance service network: The New Zealand Academy of Sport (Collins, 2008). The Academy of Sport provides services in the areas of: “coaching, sport science, sport medicine, athlete career education and training facilities.” (Collins, 2008, p. 220). It aims to provide support for up to 1500 athletes across 21 sports (Dyer, 2006). As described in more detail in chapter six, athletes supported by the Academy of Sport are referred to as “carded” meaning they have received a card allowing them to access services provided by the Academy (Dyer, 2006). The NSOs are responsible for selecting athletes to be carded along with the development of high performance athletes in their sport (Dyer, 2006). As chapter six describes, while this process sounds relatively straightforward and effective, it is contested by several coaches and athletes as not being the most effective use of sporting funds.

SPARC receives funding from two main sources: the government and the New Zealand Lotteries Commission (Collins, 2008; Hindson, 2006). Funding is distributed according to SPARC’s priorities, and although increased funding has allowed SPARC to have more control over high performance sport, SPARC remains a strategic leader as opposed to a service provider, being reliant on other groups to run sporting programmes (Collins, 2008). NSOs are in a similar position, being responsible for developing high performance and increasing participation but not directly running programmes.

¹² Collins (2007, p. 218) reports how in the mid-1990s, many sports organisations were beginning to raise concerns about the lack of support for high performance sport. A review was undertaken in 1996 with the decision to incorporate some high performance services into the New Zealand Sports Foundation, however the outcome was “less than hoped for” until the formation of SPARC in 2002.

Another influential organisation for high performance sport is the New Zealand Olympic Committee (NZOC). The NZOC assists SPARC and the NSOs with preparing and selecting New Zealand athletes for the Commonwealth and Olympic Games (Collins, 2008). In chapter three, the involvement of the NZOC in selecting athletes for the 2006 Commonwealth Games is examined and found to be a frustrating process for several gymnastics participants.

The NSO for governing all the gymnastics codes is currently named GymSports New Zealand (GSNZ). Gymnastics was previously run under the name of New Zealand Gymnastics (NZG), however on the 1st January 2008 the name GymSports New Zealand was adopted along with a new constitution and significant restructuring.

D'Amico (2000) describes how in the late 1990s New Zealand Gymnastics (NZG) underwent some restructuring, including creating the position of an Executive Officer. From 1998 until 2007, NZG was structured according to the following diagram:

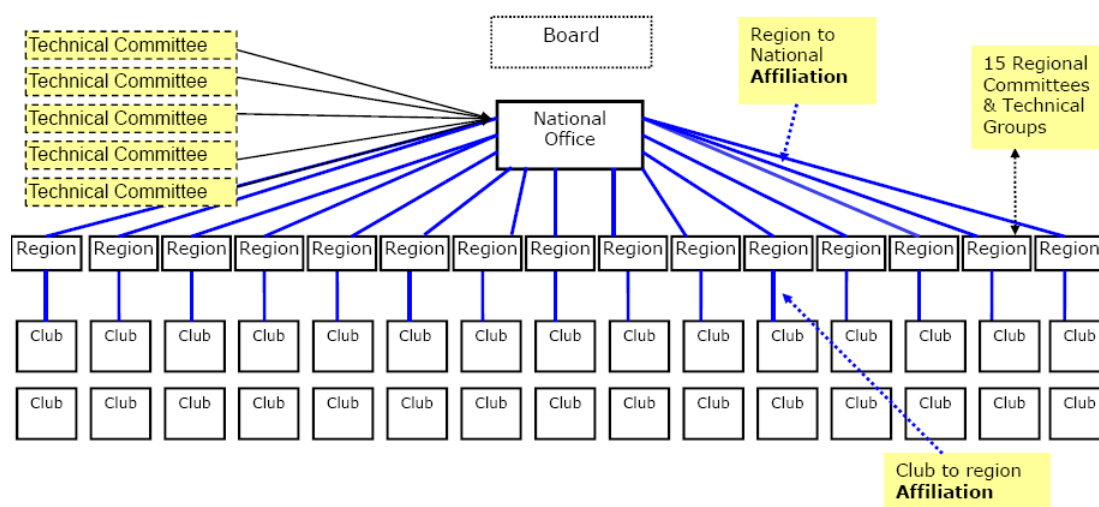


Fig. 2.1 Structure of New Zealand Gymnastics 1997 – 2007. GSNZ (2008) Personal Communication.

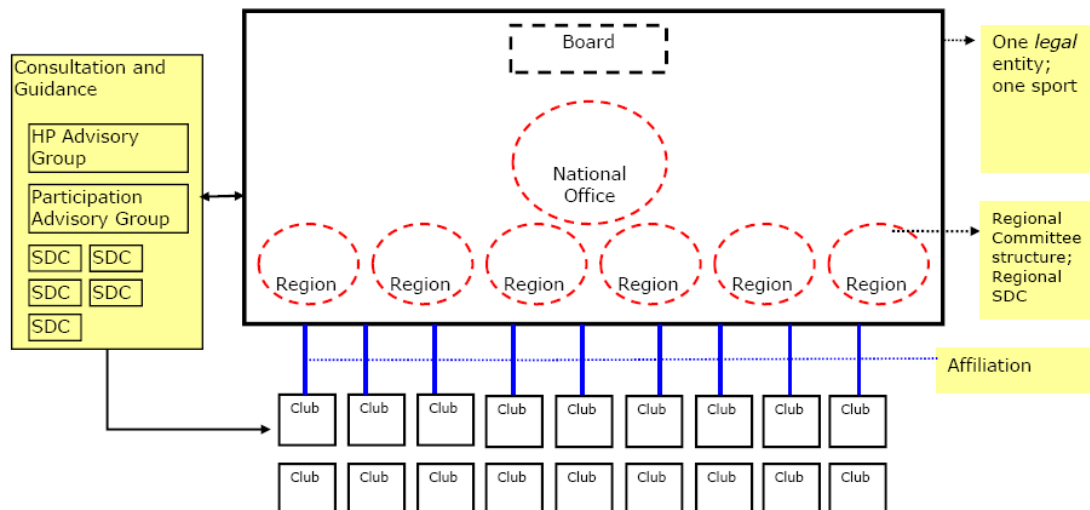


Fig. 2.2 Structure of GymSports New Zealand, from 1 January 2008. GSNZ (2008)

Personal Communication.

As the diagram shows, NZG consisted of a volunteer Board of Directors who acted through the paid staff at the National Office. The National Office further took advice from the “technical committee”, a group of volunteer experts in each code, generally high level judges and coaches. These committees made the “technical” decisions about the rules and requirements for their codes. From 2008, as the second diagram shows, the technical committees were renamed “Sport Development Committees” (SDCs) but essentially remain a similar group of experts. Other voluntary consultation groups were also added to the structure in the form of a high performance advisory group and a participation advisory group.

From 1998 - 2007, gymnasts were affiliated to NZG through 12 Regional Associations. Each region was required to pay a percentage of NZG’s budget, based on the population base of each region. For example, Auckland, as the largest population, paid the largest percentage, while the South Island, with a small population, was only required to pay a relatively small percentage. Under this system, the Regional Associations were empowered to decide how they charged gymnasts or clubs for this money and to charge gymnasts with any extra levies such as funds for coach or judge education, or a travel levy to fund sending coaches and judges to the National Championships (D’Amico, 2001). For example, the Canterbury Gymnastics Association (CGA) would charge every competitive gymnast \$1 for each Canterbury competition they entered which would go towards funding judge education. They also applied for Lottery Commission grants to pay for coaches and judges to travel to the National Championships.

From 2008 onwards, GSNZ charged affiliation fees directly to the clubs, instead of going through the Regional Associations. The new constitution requires clubs to pay these fees and submit details of all club members to GSNZ (GSNZ, 2007). The twelve Regional Associations in their previous form were disbanded and instead replaced by six Regional Boards, who instead of acting as separate legal entities, act as subcommittees of GSNZ.

While GSNZ argued that the new structure was an improvement in allowing clubs to communicate directly to GSNZ, the previous autonomy of the regional bodies which were made up of club representatives and elected by clubs, arguably gave clubs more power through these elected representatives. The new constitution was perceived by many club and regional members to be a top down model, creating a situation where GSNZ held power over many decisions that had previously been made at regional level. However, as the next section discusses, GSNZ's reliance on clubs as the providers of gymnastics programmes and on parents enrolling their children into these gymnastics classes means GSNZ has no power over the actual practices in the gymnasiums.

While GSNZ and their sub regional boards may occasionally provide grant money to individual gymnasts and/or coaches and/or clubs, these bodies do not employ any coaches or teach any gymnastics. These bodies primarily provide strategic direction, run national or regional competitions and other events, facilitate coach and judge training and facilitate communications between FIG, GSNZ, regional bodies, SDCs and clubs. The majority of gymnastics in New Zealand takes place within a club environment. Therefore, although the clubs must adhere to direction from GSNZ, clubs hold the power to choose which coaches they employ and which gymnasts they coach. This thesis explores how power relations shift between the various organisations in different contexts.

Coakley et. al. (2009) note the growth of privatised clubs in many youth sports in Australia and New Zealand, which depend on membership fees, fundraising and sponsorship.

Gymnastics clubs in New Zealand generally operate precisely in this manner, with the bulk of the finances coming from class fees, topped up by fundraising by parents and sponsorship in the form of Lottery Grant funding and corporate sponsorship.

Most clubs in New Zealand operate as Incorporated Societies, with a voluntary committee, often made up of parents, acting as a board of directors, directing paid staff in the form of coaches and administrators. Some larger clubs employ staff as CEOs or Managers, while smaller clubs often consist of 'one man bands' (sic) with one coach who performs all the coaching and administration work. The largest club in New Zealand has around 1500 gymnast

members enrolled in many forms of gymnastics classes on a weekly basis, while other clubs have only 10 – 20 members.

Clubs vary widely in their objectives. Some clubs aim to provide only fun and enjoyable gymnastics classes. Others aim to compete just at a regional level, while others are more ambitious and actively seek out national and international titles. Those which offer classes aiming towards success in high performance were those that were visited for this thesis. Coakley et. al. (2009) note how in the USA, private clubs tend to be orientated towards a performance ethic and this appears to be the case in New Zealand among the larger, more established gymnastics clubs. These clubs often view the number of national titles or the number of international representatives as proof of their success.

As this structure involves GSNZ setting policies and clubs carrying them out, there is constant debate between both groups about these policies and how they should be enacted. Attention is drawn to a number of these debates throughout this thesis where there are numerous accounts of GSNZ policies being resisted, partially enacted or overturned by club members, coaches, judges and gymnasts. Throughout this thesis, the debate about who should have the power to make decisions is followed through a range of areas.

Conclusion

The various positions of competitive gymnastics as a child sport, a feminine sport, a disciplinary institution, a subjectively judged sport and as an organisation within the New Zealand sporting structure have been drawn upon by gymnastics researchers and participants alike. As this thesis demonstrates, many of these ideas and positions are adopted by participants who employ them to make a variety of claims about gymnastics. Far from gymnastics in New Zealand being a stable entity, this thesis shows all the gymnastic codes are in a state of constant fluidity as actants arrive, leave, change position, and constantly debate. The formal shift from a regional to club based structure is a clear example of the reshuffling of identities and power relations. As this research occurred partly within each of these structures, this thesis shows the operations of the sport within each set up.

Many of the interpretations described in this chapter are ‘outsider’ accounts of gymnastics that “black box” (Kaghan and Bowker, 2001; Law, 1994) the sport in various ways. The sport has been interpreted as feminine, as destroying childhood and as problematic in its subjectivity. The bodies of the gymnasts have been identified as docile and/or abused and success in gymnastics has been attributed to a challenging and consequently troubling training regime and particular organisation structures. The main body of this thesis which follows

looks within the black boxes at the detailed workings of the sport without any attempt to interpret or explain. In line with the goals of ANT, the goal of this thesis is to describe until an explanation is revealed through the depth of description (Latour, 2005) Nonetheless, the accounts described in this chapter are significant in being commonly circulating stories about the sport, which are often drawn upon by participants.

Chapter 3

The Selecting and Sorting of Bodies

(ANT) looks behind the official accounts of method (which are often clean and reassuring) to try to understand the often ragged ways in which knowledge is produced. (Law, 2004, p. 18-19)

Documentation produced in and for gymnastics in New Zealand commonly discusses the “pathways” of the gymnasts as they move through from beginner to high performance gymnasts. As Law (2004, p. 18 – 19) notes, such documentation is often “clean and reassuring”. In New Zealand, it details the process a gymnast must go through to reach the top level. This chapter attempts to look beyond these clean and reassuring documents at the controversies, debates and arguments surrounding the process of selecting gymnasts for high performance and international competitions in New Zealand between 2004 to 2008. It follows the gymnast assemblage from first being selected as a competitive gymnast to being selected to represent New Zealand at international competitions. A great deal of this chapter is concerned with the initial selection of gymnasts into what is referred to as either the “high performance” or “international” stream. As noted in chapter one, in each code, there are two competitive options for gymnasts. They can either compete in the “levels” or “age group” competitions¹³ where the goal is only to compete well within New Zealand, or they can compete in “high performance” where the goal is to represent New Zealand internationally at the Senior International level, particularly at World Championships, Commonwealth Games or the Olympic Games. Usually, gymnasts are around eight or nine years of age when they are first eligible to compete in high performance, and within high performance, they must then compete in several grades separate from levels or age groups until they reach the age when they are eligible to compete in junior or senior elite¹⁴. This chapter explores how for a number of years, in order to compete in the high performance stream the gymnasts needed to be selected by NZG. The selection processes at all levels are revealed to be highly controversial and involve a large number of actants with varying degrees of power who invariably disagree on the form and process the selection should take.

¹³ Artistic gymnasts and rhythmic gymnasts compete in “levels”, trampolining and aerobics compete in “age group”.

¹⁴ For artistic gymnastics and rhythmic gymnastics, junior athletes are aged 13 – 15 and seniors 16+, for trampolining and aerobics, juniors are aged 15 – 17 and seniors 18+.

Although the necessity to identify talent has been noted as one of the key components of success in high performance (see Digel, 2002; Dyer, 2006; Green and Houlihan, 2005; Houlihan and Green, 2008; Oakley and Green, 2001; UK Sport, 2006), very little literature exists about processes of selection and the disputes these selections invariably engender. This chapter follows the processes of selection that allow gymnasts to compete in high performance, including exploring the disputes and controversies around the selection process. It primarily focuses on the processes in place in 2005, when a very specific pathway was in place.

The controversial nature of the selection of gymnasts into the high performance programmes runs across a number of levels within New Zealand. At the local level there is controversy within individual gymnasiums over whether particular children are coached by coaches who are perceived by parents to be high performance coaches. Parents often desperately want their children to be selected into high performance, regardless of how well the child performs once at that level. At the national level there are disagreements between the coaches, parents, judges and administrators over who should be in the high performance stream and how the decisions are made to put them there. At the international level other bureaucracies such as the NZOC add their point of view to the debate about who should represent New Zealand internationally. This chapter follows the practices, debates and views of a range of coaches, judges, administrators and sports scientists regarding the high performance selection process from the local to the international level. The selection process is revealed to be highly unstable, moving from physical ability testing to competition testing or to no testing at all. Although it appears the coaches dominate this debate, this is partially the result of many coaches also holding decision making positions as judges or administrators. They identify themselves as coaches and are thus defined here as such however in practice they may very likely also hold an official position on a NZG committee which will no doubt influence their point of view regarding selection.

The first part of this chapter outlines some of the key actants and some of the differing views on talent identification. The next part follows the dominant test for selection into high performance in the form of a physical ability test, throughout 2005, from the local to the national level. The test was created and produced at the NZG offices in Auckland, before being circulated around the country, causing coaches to mobilise gymnasts into taking the test. After the test occurred, the test scores were translated into formats that allowed gymnasts to be selected or not selected. The final part of this chapter follows the high performance gymnast trajectory beyond the PAT/DAP test to the international level by examining several examples of selection processes that occurred once the gymnasts passed the test.

Government Intervention in High Performance Sport in New Zealand

The necessity to identify athletes with the talent to succeed in particular sports has been found to be a crucial factor in the production of successful athletes. Many governing sports bodies have visions of identifying and developing talent with the eventual goal of performing at the senior international level (Martindale, Collins and Daubney, 2005). This is the rationale behind NZG/GSNZ requiring gymnasts to be selected before being allowed to compete in high performance. Houlihan and Green (2008) document a range of studies of successful elite sport systems all of which include some form of talent identification, or selection of talented athletes, as crucial (see Digel, 2002; Dyer, 2006; Green and Houlihan, 2005; Oakley and Green, 2001; UK Sport, 2006). Talent identification is at the core of centralised systems such as in China, currently one of the most successful sporting nations. The process in China involves selecting children aged six – nine from school through physical testing, before being sent to a specialised local sport school. At this school, they train three hours per day, four or five times per week for a number of years, before the most promising athletes are selected to train at provincial and later at national training centres (Hong, 2008).

According to Collins (2007), in contrast to China, New Zealand has constantly spurned the concept of a centralised sports system. New Zealand has a crown entity, Sport and Recreation New Zealand (SPARC), which is responsible for all government sporting policy (Collins, 2008). As noted in chapter two, SPARC works together with the National Sporting Organisations (NSOs) such as NZG/GSNZ, in implementing appropriate systems. SPARC receives significant government funding for elite sport, however little of this funding is allocated to gymnastics. The majority goes to sports that have generated Olympic medals or that are considered important to New Zealanders (Collins, 2008). As this chapter describes, although the initial talent identification process for selecting gymnastics into high performance is administered by NZG, the selection of gymnasts into New Zealand representative teams involves both NZG and the NZOC.

Selecting and Discarding Tests

The official documentation produced by NZG regarding high performance selection reveals that the classification system for high performance gymnastics aims to classify gymnasts into those who have potential to compete at the international level and those who do not. In examining processes of classification, Bowker and Star (1999, p. 5) describe how: “Each standard and category valorises some point of view and silences another”. The system of

classification that has been dominant in New Zealand gymnastics valorises the view of the body as the most crucial actant in the creation of gymnastics, although some coaches argue that a talented body is only one of many factors necessary for gymnastic success. The dominance of the body plays out through the system most often used in New Zealand which involves testing the physical ability of the body before allowing the body to compete in high performance. The test is known as either PAT: Physical Ability Test, as it is called in women's gymnastics, men's gymnastics and aerobics, or DAP: Developmental Assessment Programme, as it is called in rhythmic gymnastics. This test was administered to men's gymnastics, women's gymnastics, rhythmic gymnastics and aerobics in 2005 and to men's gymnastics, women's gymnastics and rhythmic gymnastics from 2002 - 2004. All high performance gymnasts were required by NZG to take the test annually in order to continue competing in high performance competitions. From 2006 – 2008, only men's gymnastics included the test. The other codes used either a qualifying score or allowed the coaches to choose whether their gymnasts could compete in high performance. In 2009 – 2010, the testing was implemented again in rhythmic and women's gymnastics. Trampolining has never included a test¹⁵.

Bowker and Star (1999) describe a classic divide between Aristotelian classifications and prototype, or Platonic, classifications. Aristotelian classification works according to a set of binary characteristics where “the object being classified either presents or does not present” (Bowker and Starr 1999, p. 62). As will be described in more detail shortly, this is the basic format of the PAT/DAP test which contains a list of characteristics that must be present in order for the gymnast to be classified as high performance. However, many elite coaches adopted a prototype mode of classification (Bowker and Star, 1999), in assuming that there was an ideal “form” (Plato trans. Jowett 1871, p. 192) of the elite gymnast. While no coach ever expects to come across a child that perfectly meets this ‘form’, the selection process used by coaches for finding appropriate gymnasts often comes down to an estimation of how close they come to the ideal. Coaches are happy to forgive weakness in some areas if they have strengths in others. The ideal form is generally believed to consist of a gymnast who has a particular hard working attitude, is highly motivated, is from a high socio-economic background, is able to train an enormous number of hours without getting injured and has parents who are willing to enrol them in gymnastics without interfering in the creation of the gymnastics. Unlike an Aristotelian classification system, coaches tend not to consider these traits as either present or not present, but rather that all gymnasts should have some degree of

¹⁵ Trampolining coaches argue that physical ability testing is not relevant in trampolining, and instead trampolining has relied only upon setting qualification marks at competitions as their selection process for all levels, grades and competitions.

these traits, with there being a great deal of variance between how much of each trait is considered desirable. Coaches Liam and Meg described their view of the ideal form:

So body shape, parents, to prepare for what's going to come ahead of you, co-ordination skills, physical abilities, strength, flexibility... you can afford to pay your fees, you can look after your diet, you can get to training. There's lots of aspects that I have to take into consideration when I'm looking at a child. (Liam)

I kind of choose the kids not 100% ability wise, a lot of it is work ethic, body type, parental support. I'd say 30% would be natural talent, in my opinion... Sane parents and financial. (Meg)

Liam and Meg both identify economic capital and supportive parents as significant components of the high-performance-gymnast assemblage. The necessity of economic capital to compete in high performance sport has been argued to be highly exclusionary in high performance sport. In a study of exclusion from high performance sport in the UK, Collins (2003) argued for the need for methods by which children from lower economic families can have the same opportunities for competing in sport at the highest level. Collins (2003) argued that government supported schemes should ensure equal opportunities for all children regardless of economic status. However the lack of government funding for high performance gymnastics in New Zealand means that the burden of training costs inevitably falls upon the parents. Although there are various grant schemes available to assist children from lower economic backgrounds competing in high performance sport, these grants are insufficient for paying for all the training a high performance gymnast requires. The necessity of parental support is also recognised in the SPARC talent identification report which recommends the country should aim to educate families about early motor skill learning and facilitate methods for athletes to train the necessary hours to excel at their sport (Scott, 2004).

As the above comments by Liam and Meg suggest, coaches working with high performance gymnasts sometimes hold different views about what factors are important for high performance success. Coaches tend to adopt the view that an effective body is only one of a large number of factors that the assemblage 'high-performance-gymnast' needs to include. A number of researchers agree with this view. Lidor et. al. (2005) examined physical skills of a team of hand ball players over a two year period and found no statistical similarity between those athletes who performed well on a physical ability test and those who succeeded two years later, suggesting other factors must be involved. Abbott and Collins (2002, 2004) describe a number of studies which confirm the inability of physical ability tests to predict

future success in sport. Abbott and Collins (2004) argue for a wider range of psychological tests to be included in talent selection tests, including tests for the ability to work hard and remain motivated. Falk et. al. (2004, p. 347) in their study of water polo players, agreed by arguing that talent selection should have included a greater emphasis on “game intelligence”¹⁶ as opposed to merely physical skills and attributes as a better method for predicting future success. The gymnastics coaches interviewed and a New Zealand specific SPARC report on talent identification (Scott, 2004) agree that while physical and psychological are important, the high performance athlete assemblage requires a wider range of abilities in order to succeed. Nonetheless, the test used in gymnastics tested purely physical attributes.

Creating the PAT/DAP Test

The first PAT/DAP test was created in the mid 1990s, with rhythmic gymnastics being the first code to adopt the DAP test. Prior to this there was no test. Each coach decided which of their gymnasts would compete in high performance. A rhythmic coach, Karen, described how the DAP test was introduced in rhythmic gymnastics because it was perceived to be crucial in preventing bodies competing that could not cope with the pressure of international requirements:

...why we did this was because for a number of years there'd been girls competing in the elite grade but getting hurt year after year because they weren't getting selected (there was no official test). They were putting in huge hours etc. and we thought that there has to be an honesty sort of system and we have to be accountable that the right girls are selected for the sport. And it was to help coaches too. A lot of them were blind because you get quite close to your gymnasts and they were blind that their gymnasts were right. (Karen)

Karen identifies two reasons for introducing this testing system. She argued that bodies can become easily injured unless they are the “right” bodies for the sport. This argument assumes there is a level of risk involved if the “wrong” bodies should be selected. This speaks to the gymnastics literature that emphasises the potential harm, mainly in the form of injuries, which can befall gymnasts, as described in the previous chapter.

Secondly, she suggested a testing system was needed to bypass coaches who had been shown to be unreliable in selecting gymnasts owing to their closeness with their athletes. She argues

¹⁶ This refers to the players' abilities to make appropriate tactical decisions.

for a system that replaces the coach in selecting the appropriate bodies. In arguing in this way, Karen distances herself from her own role as a coach and instead speaks for NZG. In describing being “accountable”, Karen essentially argues for a method that neutralises the potentially intimate relationships between coaches and athletes through bureaucratic coding.

Karen’s reference to the “right” bodies refers to bodies that can work most effectively as part of the gymnast assemblage for each code without becoming injured. For example, a men’s gymnastics body with very strong arms and shoulders and a light body is more effective at assembling together with the rings to create a high scoring routine according to the Code of Points. Similarly, in rhythmic gymnastics, the Code of Points awards the highest marks for demonstrations of extreme flexibility, so bodies that are naturally flexible are far more effective in rhythmic gymnastics. Karen argued that bodies that are not flexible which attempt the movements required for international competition are likely to become injured. The PAT/DAP test was designed with the aim of selecting those bodies which could perform most effectively in each code.

The choice to valorise the point of view of the body as the most important component to test was also the result of an assumption by coaches and sports scientists that the body is the most stable part of the gymnast-assemblage. Coaches have suggested that limitations in the body cannot be overcome as easily as other components. For example, a gymnast without financial resources may be able to obtain grants or sponsorship to continue training, or a coach may be able to educate parents who do not support their child competing in high performance gymnastics, however only certain bodies are able to reach the elite level. Coaches appear to believe that bodies must possess certain physical traits to compete in elite gymnastics, which cannot be taught and must be inherent in the body. It is believed that bodies without these traits will either not be able to perform elite level skills or will become injured attempting them. For example, the presence of fast twitch fibres is a necessity in all codes for jumping, vaulting or leaping. It is argued that although gymnasts with a predominance of slow twitch fibres can learn to perform these moves, they will never be able to gain the degree of success that bodies with a high proportion of fast twitch fibres will obtain and are very unlikely to reach the international level. Similarly, flexibility can only be improved to a certain degree. Coaches in rhythmic gymnastics described how flexibility can be identified when stretching gymnasts. If the coach feels resistance very quickly, it is thought to be impossible for those gymnasts to obtain the level of flexibility of top elite gymnasts no matter how much they practise and stretch.

NZG's decision to create the PAT/DAP test in New Zealand was also partially the result of the copying of 'best practice' from other nations. In this sense, NZG attempts to copy the ways in which other nations have institutionalised expertise (Abbott, 1988). It is believed that other nations with more successful results have utilised the professional expertise of sports scientists and coaches to create effective testing practices which it is logical for New Zealand to copy. Karen described how when the DAP test was developed for rhythmic, information and statistics were obtained from "the Australians and the Russians" that were used to create the test. She described the information obtained from these sources as "background proof" that the tests were appropriate and the correct ones to administer. Two sports scientists involved in the creation of the tests described how the tests were taken from these countries and then altered to be appropriate to New Zealand's resources. For example, the anthropometry tests in the Australian and Russian tests were removed because at the time of the creation of the tests there were very few trained anthropometrists in New Zealand. Anthropometrists are experts in measuring the body's exact proportions, which many believe to be crucial to the talent identification process. Judy, a sports scientist, described how the DAP test was created by sports scientists and it came about through assembling ideas and information from a variety of sources: "...there's a lot of people who've been involved in it... There was input from NZG, medical and physio input, tech(nical) committee input, all that sort of stuff." She explained how the expertise from a number of different specialised professions was combined together to create the test. As with many scientific inscriptions, the labour and methods which created the DAP test have become somewhat fuzzy and instead the inscription, the written DAP test, has come to be all important (Latour and Woolgar, 1979).

In women's gymnastics, Jessica, a coach, described how the PAT test was originally written by an experienced high performance coach and reviewed by a committee of sports scientists before being finalised. Similarly in aerobics, an aerobics judge described how the aerobics PAT test was written by a coach in consultation with a sports scientist. Kevin, a men's gymnastics judge, described how in men's gymnastics, the PAT test was and remains identical to that used in Australia.

Using the processes described above, an inscription of the PAT or DAP test, in the form of a manual, was created for each code. By 2004, there were manuals for all of the competitive codes except trampolining which described and showed diagrams of all the exercises that the gymnasts would be tested on.

Circulating the PAT/DAP Test Manual to the Clubs and Coaches

Once the PAT/DAP test reached its first level of existence as an inscription in the form of a manual, it was circulated throughout the country to mobilise the gymnasts to take the test. The manual was posted to all gymnastic clubs and coaches, who subsequently used different methods for deciding which gymnasts to invite to take the test.

For the first few years of the DAP test in the 1990s in rhythmic gymnastics, some clubs chose to have all their gymnasts tested even if the coaches knew the gymnasts had no chance of passing. Rhythmic coach Karen described:

...they used to put them through to get feedback on coaching, for their good levels girls. The girls knew they weren't being looked at for international, but they were being tested for their own sake to see where they were in their own programmes. (Karen)

For these coaches, the DAP test became more than a selection procedure. It was translated into a method for coaches to externally test themselves and the progress of their gymnasts. This demonstrates how even simple processes can be translated and used in ways unexpected by the designers (Latour, 1991). Later, this practice fell away with coaches in 2004 and 2005 tending to only put forward gymnasts who they felt had a chance of passing the test as it was perceived to be a waste of time.

For men's gymnastics in 2005, the number of gymnasts tested was far lower than ever before. Kevin, a judge, described how in men's gymnastics the circulation system was altered from 2004 to 2005. In 2004, the circulation of the manual was much wider, with all gymnasts being invited to be tested rather than only those the coaches recommended. In 2005, the circulation process was altered to include the coach's opinion into the assemblage, asking coaches to only bring gymnasts to the testing who they knew could perform the necessary exercises and therefore have a higher chance of passing the test:

...in 2004 we¹⁷ judged over 100 kids and took in two. So we decided that our time was better spent with kids who were really interested in gymnastics... So in 2005 we decided that we would leave it to the coaches. We would give the coaches the opportunity of putting forward their charges, but at the end of the day, we would make

¹⁷ Kevin refers to the men's gymnastics technical committee, a group of coaches, judges and administrators who make the technical decisions about the rules of the sport in New Zealand.

the decision. And it worked very well. Out of 38 or 40 that were put forward, we selected 23. (Kevin)

According to Kevin, the test became more time efficient and effective as a result of encouraging coaches to pre-select bodies before having them tested. Less gymnasts were tested however more were selected into the high performance programmes. Jessica, a women's gymnastics coach, described a similar occurrence in women's gymnastics. She described how prior to 2004 they would test around 40 gymnasts each year but only around two passed, whereas in 2005 they increased the age of testing to a minimum of nine years old, which resulted in more gymnasts passing, since they had a greater amount of strength at this age, but less gymnasts were actually tested over all.

The men's gymnastics concept of encouraging coaches to "pre-select" gymnasts for testing is one which many coaches were already doing themselves. Many high performance coaches had their own selection tests for admission into their own programmes. Several high performance coaches felt they had the ability level and confidence to test their gymnasts for high performance without needing a formal test administered by the national governing body. Karen argued that coaches cannot select the gymnasts themselves because they are too biased about the gymnasts they work with and so cannot fairly evaluate whether the gymnasts have enough talent. However, one of the flaws in Karen's logic is that she assumes that the coaches will not be biased once they have the 'correct' bodies in their programme. Yet, New Zealand has experienced countless incidents where the 'correct' bodies have received a significant lack of attention by their coach because the coach does not agree that they should be in the high performance stream. Anna, a women's gymnastics coach, argued that the testing was unnecessary for her: "I don't need the testing. If a girl comes into my group, I just watch her and see if she is right for high performance." Rhythmic coach Meg described the compulsory testing practice as "crap" because "I've never seen in my life the kid that scores the highest in the tests is the best gymnast. Never ever ever!" Certainly this did appear to be true in a number of cases, where the gymnast who had scored number one in the country in the test was eclipsed in competition by a gymnast who had scored number five or six. Natalie, an aerobics coach and judge, agreed that the competition itself would weed out gymnasts who should not be in the high performance stream and that a test was unnecessary:

Personally, I think... if a child wants to compete in the international stream let them! If they're not good enough they won't go anywhere. It doesn't need to be this complicated, they certainly won't stay in the international stream if they're not good enough. (Natalie)

However, with the mandatory testing in place in 2005, high performance coaches within clubs developed strategies for identifying the gymnasts they thought should be put forward for testing.

Mobilising the Gymnasts: Local Methods

Once the manual was circulated to the clubs and the coaches, these clubs and coaches then chose which gymnasts to mobilise into taking the test. A huge range of local strategies for ensuring gymnasts progressed through to high performance existed within and among clubs.

The majority of gymnasts begin by attending some form of fun gymnastics class¹⁸. These classes are generally for young children aged around five – ten years of age and involve the children learning some basic gymnastics skills while also having fun. They may be after school classes, school holiday classes or during school classes. The child may attend these types of classes only once, or for several years.

The set up of each code requires different attributes for success. Coaches perceive one of the challenges in New Zealand gymnastics to be ensuring that children with talent for a gymnastic code begin working in that code. Very often bodies with specific talents are enrolled in the ‘wrong’ code either through parental or child choice. Often this is ‘corrected’ later on, with numerous incidents of gymnasts switching codes at an older age, particularly from artistic gymnastics to the other three codes¹⁹. Clubs that run more than one code frequently have coaches ‘fighting’ over talented children that have bodies that coaches perceive could be successful in more than one code.

The step of ensuring the ‘correct’ body is enrolled in its ‘matching’ code is one which many clubs and coaches have strategies for. Larger clubs, particularly those which cater for more than one code, generally have very structured methods, such as the one described by a coach in one of the largest gymnastic clubs in the country:

¹⁸ These are most often known as recreational classes, general gymnastics classes or school or holiday programmes.

¹⁹ Some of the most successful gymnasts in New Zealand in rhythmic gymnastics, aerobics or trampolining began in artistic gymnastics at around age 5 – 7 and moved to the other code aged 12 – 14. Artistic gymnastics teaches all basic body movement skills plus places very high training demands on the gymnasts, giving them an excellent foundation for all sports and allowing them to move across the codes very successfully.

We've got quite a structured programme all the way through from preschool. That's run by (name). She supervises the play gym and watches all the 5-6 year olds. Then basically, from that class they're pointed in different directions. So she will give them a little slip at the end of the term saying they will move into, for example, the Friday gym class or the junior levels artistic programme. We have a TOPS squad...The TOPS squad go through from there and some of them get directed into the rhythmic recreation class, and from there it's coach selection into competitive squads, or if you think they're at a level where they could do well at high performance it's a case of getting them ready for the (DAP/PAT) test. (Tricia)

Other, smaller clubs cannot afford to have a structure and instead use more ad hoc methods of moving children into the competitive stream, such as described by Mike, a men's coach:

...it's really just keeping an eye out and seeing if they can make the grade... or someone might mention that a kid's got talent. I mean, we're not really actively looking for them because we haven't really got the resources to do that. (Mike)

The identification of talent at this level usually shows up either by a child already being able to perform movements taught in the class or taught in higher level classes than that class. For example, I observed how in one club a child brought a friend who could already perform somersaults in the air, having taught herself in the back yard. The manager of the club saw her performing these somersaults and immediately rushed out to find the parents to enrol her into a competition class. However, this is an extreme example and very unusual. More likely, gymnasts may be able to naturally perform the splits demonstrating a high level of natural flexibility, or be able to easily pull themselves up on the bar in a chin up showing natural strength, or simply may be able to perform everything they are taught with ease the first time they try. As in many cases gymnastics classes go for a school term of nine to ten weeks, coaches and administrators believe it is a relatively simple matter for coaches to identify the children who show gymnastic talent over this term-long period.

In a couple of clubs, coaches were particularly determined to find gymnasts who resembled the ideal "form" (Plato trans. Jowett 1871, p.192). In an effort to do so, they visited locations outside of gymnasiums to find such children. One artistic coach visited all the private schools in his area and tested a number of children during their lunch hours in an effort to locate children who included economic capital as part of their assemblage. A rhythmic coach visited ballet schools and approached any children she perceived to be performing well in ballet, reasoning that ballet and rhythmic gymnastics have similar requirements.

Some of the foreign born coaches described the difficulty of finding parents in New Zealand willing to support the many hours of intensive training at a very young age that they perceived most of the gymnastics codes, in particular artistic gymnastics, to require. Some argued that the New Zealand culture is not conducive to success in gymnastics because parents often object to the idea of their children training sometimes up to 25 hours per week before age ten.

This discourse is exemplified by Ryan. As described in chapter two, Ryan's influential work on gymnastics: *Little Girls in Pretty Boxes*, details the lives of several gymnasts and figure skaters. Ryan describes:

And she knows she might have only one shot. By the next Olympics she might be too old. By the next *year* she might be too old. Girls in these sports are under pressure not only to win but to win quickly. They're running against a clock. (Ryan, 1995, p. 8)

As the above quote demonstrates, Ryan argues that both sports have allowed the practice of what in some cases she interprets as child abuse because the girl-shaped bodies are more effective at gymnastics and figure skating than women-shaped bodies. She argues:

The physical skills have become so demanding that only a body shaped like a missile – in other words, a body shaped like a boy's – can excel. Breasts and hips slow the spins, lower the leaps and disrupt the clean, lean body lines that judges reward (Ryan, 1995, p. 7).

As described in chapter two, what Ryan states here as fact is a belief held by many in the gymnastics community. It is believed that gymnasts must start as young as possible and train numerous hours at an early age in order for them to be able to reach the elite level. Many coaches structure their training programmes around this belief, particularly those coaching women's and men's gymnastics. In these programmes, the goal is to make time pass as slowly as possible as the gymnasts try to learn skills as quickly as possible before they grow larger. Therefore finding a gymnast with parents willing for their children to train this amount of hours at a young age is considered highly important but very difficult in New Zealand. There were several cases in which coaches wanted to put gymnasts forward for the tests but the parents of the gymnasts refused to allow it. The parents considered high performance training far too intensive and too similar to child labour to be acceptable.

Sometimes, administrators in clubs also disagreed with coaches over allowing gymnasts to train many hours at an early age. Frequently, there were conflicts between high performance coaches and club administrators over the acceptable number of hours that gymnasts should train. In one club, an administrator implemented a policy that no child could be selected for a high performance programme under the age of seven, a policy that a high performance coach employed by that club considered very frustrating.

These examples emphasise the kinds of debates that frequently occur between coaches, parents and administrators. Many policies are adopted by various members of these groups in response to these debates. For example, the administrators of one club insisted that training must be visible to parents at all times in order to ensure transparency and to avoid any accusations of abuse. Some coaches in the club did not like this policy as they argued that the gymnasts were too distracted with their parents present. These examples highlight the importance of these different actants in the high performance gymnast assemblage and demonstrate the way that the controversies as described in chapter two can play out within the gymnasium.

Some gymnastics coaches discussed how the ideal gymnast assemblage must also include a gymnasium and coach who are able to take this ideal child and transform them into a gymnast. Coaches are often concerned that there may be children very close to the ideal form 'out there' who are not enrolled in gymnastics, as Liam described:

There may be kids in Te Atatu, or Invercargill or maybe in Kerikeri or wherever, but how do I know they're there if I can't go out and see them? They may be in school programmes, they may be at whatever but if I can't see them and understand the material I need to pick, then it's not going to happen. (Liam)

In New Zealand there is currently no arrangement that allows coaches like Liam to coach children who reside in far away areas. This contrasts with countries such as China, which has a highly nationalised system where children are plucked from their primary schools and moved to specialised environments in order to develop their talent (Beech, 2004). Further, there is no system of ensuring that a child selected for high performance includes these non-physical components, such as high socio-economic background and supportive parents, as described by Meg and Liam unless the coaches themselves use these components to pre-select their gymnasts before putting them forward for the PAT/DAP test.

Instead, at the National level, focus remains on finding the ideal human body able to work with the apparatus. As described previously, Abbott and Collins (2004) describe how one-dimensional models such as the PAT and DAP, which privilege the body and focus on physical ability to the exclusion of all other factors, have been the traditional method of talent identification in sport. They argue that although more recent research suggests that talent identification needs to take into account a wider number of variables, in particular psychological factors, the logistics of using a multi-dimensional model are too complex for practitioners to adopt (Abbott and Collins, 2004). They claim that while physical body tests are clearly set out for each sport, the exact desirable psychological traits are less well defined and lack objective tests (Abbott and Collins, 2004).

Once the gymnasts are identified as talented from a fun gymnastics class, there are several trajectories they may follow. If children continue down the competitive gymnastics trajectory, once their talent has been recognised they will now start competing for a gymnastics club. Although there are school championships, in order for gymnasts to compete seriously in New Zealand they always represent a club. In men's gymnastics, women's gymnastics and rhythmic gymnastics, gymnasts will almost certainly begin working their way through the levels 1 – 10. In trampolining and aerobics they will start competing in their age group, and in trampolining possibly in grades 7 – 1, as well. Most commonly, high performance coaches select children from this group of competitive gymnasts to put forward for testing. In some cases, a high performance coach may be already coaching a group he/she believes to be talented and the whole group will be invited to take the test. In other cases, the coach invites identified children from the recreational, school or other competitive classes to take the test and only works with those who pass.

Taking the Test

Once the gymnasts were chosen by the coaches and given the documentation about when and where the test would be held, the gymnasts arrived to take the test and the test was transformed from an inscription into a set of exercises that took around an hour to perform.

In 2005, passing the PAT or DAP test was a requirement for all gymnasts wishing to compete in high performance in women's gymnastics, men's gymnastics, rhythmic gymnastics or aerobics. Molly, an NZG staff member, described how it worked: "They are tested on strength and flexibility. Those are the 2 core things. Within that there's a broad range of tests." The tests were carried out in a gymnasium where there were 10 – 15 'stations' created for the 10 – 15 tests. For example, these included a start and finish line for a 20m sprint, a high bar for

chin ups and wall bars for leg lifts. In men's gymnastics, the testing was connected with the National Championships, with the men's gymnastics technical committee reasoning that all the gymnasts being tested will have been competing in the one place and can all therefore come to the gymnasium for the testing on the same day under the same conditions. In other codes, there were two 'testings' carried out, one in the North Island and one in the South, which attempted as far as possible to include identical conditions. The gymnasts were invited to arrive at a particular time, usually with their coaches, and were required to attempt every exercise while being evaluated by a coach or sports scientist. In some cases, the gymnasts were allowed several attempts at an exercise to ensure an 'accurate' result.

The exact exercises varied from code to code. While some exercises appeared in all codes, such as testing the ability to do the splits, or to run fast and jump high, others varied extensively. For example, a test included in rhythmic that was included in no other code was the ability to catch something quickly, a skill that is applicable to rhythmic gymnastics but to no other code owing to the rhythmic gymnastics gymnast assemblage including hand held apparatus. The test involved a ruler being vertically dropped and the gymnasts having to catch it as fast as possible. The number of centimetres down that the gymnasts caught it indicated how fast they had reacted. Judy, a sports scientist who was involved in writing some of the tests, described how it was not only about strength and flexibility tests: "It's not just testing science, but skills as well. In rhythmic gymnastics, we test how many pirouettes they can do. In artistic, we test handstands." Natalie confirmed the use of code specific tests by describing how the PAT test for aerobics was rewritten by the aerobics technical committee to include the exact movements used in aerobics rather than tests that tested fitness but not in a way that was relevant to aerobics:

They made (name) who's Senior International, do the beep test²⁰, and I was going "what is the point? This is an anaerobic sport!" And also because he's of course incredibly fit and he's doing the beep test with some rugby players and he absolutely blitzed them which didn't go down too well. But there was no point to a lot of the tests they're doing. They'd make them do a bench press for a strength test when aerobics is based on push ups so why not do a push up test? So that was the biggest difference we made – we made it sport (code) specific. They did an anaerobic sprint test, they did a push up test, so that was the way they were designed. (Natalie)

²⁰ The beep test, otherwise known as the "bleep test" or "multi-stage fitness test" consists of: "run back and forth on a 20 m course and must touch the 20 m line; at the same time a sound signal is emitted from a pre-recorded tape. Frequency of the sound signals is increased 0.5 km h⁻¹ each minute from a starting speed of 8.5 km h⁻¹. When the subject can no longer follow the pace, the last stage number announced is used to predict maximal oxygen uptake." (Léger et. al., 1988)

One of the fundamental premises of actor network theory is the impossibility of definitively separating human and non-human elements (Callon, 2004). In the case of testing gymnasts, the impossibility is in separating the gymnasts from the movements they perform. The testing is supposedly designed to examine gymnasts in order to predict which movements they will be able to perform, however the only way to do this is by testing other movements which are fundamental to movements they will need to perform at the peak of their gymnastic career. Although the sports scientists attempt to separate the 'science' meaning genetic abilities from the 'skills' meaning movements, it is really not possible. Testing the 'science' requires the gymnast to perform movements anyway. Coaches and scientists literally 'follow the movement' when selecting gymnasts for high performance, through both training and testing.

Translating the Test

At the conclusion of the tests in 2004 and 2005 a huge amount of information was gathered in the form of numbers on sheets of paper, photographs and videos. In 2005, this data was translated by sports scientists into an overall 'score' for the test, which was then passed on to NZG. Prior to 2005, the translation process was performed by a coach. Although the coach was not actually associated with any particular club at the time, there was still suspicion that the coach was biased. In 2004, some of the testing was done for the first time by sports scientists, in an attempt to create a more objective test, as described by several people:

They felt the need to be more scientific, more objective as opposed to subjective and to have a better way of recording results, a clearer way, and that's when they brought the sport scientists in. (Kelly, coach)

Last year (2004) was the first time it was done by sports scientists... The parents haven't been able to question it and no one has yet. (Karen, coach)

The tests were developed because coaches and parents complained about the objectivity. The coaches who used to do the tests were very biased. Sports scientists were brought in because they could be objective. (Penny, sports scientist involved in the testing)

In these quotes, both Karen and Penny emphasise how parents and/or coaches at times questioned the results of the test, confirming that the results of the test have historically been controversial and argued over. Molly, from NZG, described how it was not so much the

sports scientists themselves that were providing objectivity, but the fact that the scientists were hybrids of particular knowledge and specific equipment: “We’re using a lot more equipment, photographs and electronic devices to do all the tests.” In comparison with the coaches, the sports scientists were seen as impartial and objective, able to make unbiased judgements. However if photographs and videos are taken, the objectivity is provided from these actants, making the scientists only useful for their ability to use this equipment. For example, when a photograph is taken of a gymnast sitting in splits and the angle of the split measured by a computer programme, and written into a spreadsheet, there is no need for an objective scientist. Instead, there is a need for a person who can work the computer programme. Thus, the scientists were introduced not because they were objective, but because they possess and use the cameras, tape measures and software programme which were considered to provide objectivity. This objectivity was perceived as necessary by NZG, parents and coaches because it was believed that the coaches who previously performed the testing were unreliable. The enrolment of sports scientists into the gymnastics network is discussed in more detail in chapter six.

The cameras, tape measures and software also rendered the performances of the gymnasts mobile. Prior to the introduction of these actants, the performances were immobile, forcing a coach to be the mobile actor who travelled the country and evaluated the gymnasts. These new actants allowed the gymnasts’ performances to be translated into numbers and video data which could be gathered together in one place, compared and evaluated. Once translated, the performances could be stored on paper or on camera and sent to one place for evaluation. The software programme’s ability to translate the camera data to numbers allowed final results to be tabulated. For example, one of the most important tests for gymnastics is to find out how well a gymnast can jump in the air and do the splits. Both a camera and the human eyes can ‘see’ a gymnast perform this. However, there is no way for the human eye to stop the gymnast in midair and measure the precise degree of leg split at the peak of the split jump. Computer software, by contrast, can do precisely this. The split jump is translated by the camera into video footage, thus rendered mobile and able to be transferred to the computer, which is then able to translate the video footage into a distinct number of degrees. It is the ability of these actants to translate the movement and to make it mobile that makes them valuable.

This test also reveals the ability of the video camera to ‘stop time’ in freezing one particular moment in time. Wajcman (2008) describes how technologies such as the video camera are valuable precisely for their ability to slow down and stop time, a concept which will be explored further in later chapters. In this case, the freezing of the particular moment allows that moment to become stable and therefore able to be analysed in much greater detail.

Judy, a sports scientist who was at one stage contracted by NZG to evaluate the PAT test, described how the scientists awarded the gymnasts the actual scores for the tests, such as how many chin ups performed, then converted these scores to an overall figure. This figure was then given a percentage weighting, and sent to NZG, who calculated a final score and made the final decisions about selection, before sending these results to the coaches.

Judy felt however that the data provided from the tests was insufficient for the decisions being made: “It is really tough making decisions based on these scores. Really tough.” She described how in many cases, the scores were not reliable enough and did not reflect the different ranges and abilities:

For example, in some tests there was not a lot of difference, such as sit ups in 10 seconds where almost everyone got between 7-9; it’s too small a range to be significant enough. Similarly, in the sprint test, only a few girls actually got on the scale, and in other tests, everyone was really high. They didn’t show up all the different ranges.
(Judy)

Another sports scientist, Penny, suggested that as the results went to NZG before being sent out, decisions about who passed the tests were not based on the results of the tests at all, but on whom the personnel in charge of the testing at NZG thought should be in high performance. Two judges also recalled instances where NZG personnel had asked them their opinions of who should be in high performance prior to the test results being released, suggesting that other ideas were taken into accounting rather than only the testing.

However, it is possible that this method of decision-making was potentially more effective than using the results of the tests. As the literature describes (see for example, Abbott and Collins, 2002, 2004; Falk et. al., 2004; Lidor, et. al., 2005; Scott, 2004), tests such as PAT/DAP are not ideal in predicting future performance of a gymnast. While the tests are excellent at demonstrating the physical abilities of gymnasts right at that point in time, they cannot predict the physical abilities of gymnasts in the years to come (Abbott and Collins, 2004; Scott, 2004). They do not reveal the future. By talking to the coaches and judges who are more closely involved in the development of the gymnast, it is possible that a fuller picture of the gymnast will be built up of the gymnast’s future potential than that given by the test. Adam (2004) describes how science and technology remain very poor at predicting the future owing to the enormous number of potential causal factors and their interconnectedness. This is equally true of the gymnast assemblage, where the number of factors that can affect

the outcome is too large to be fully considered. Adam (2004) describes how in lieu of specific predictions, a common way of predicting the future is to apply experiences from similar situations which have occurred in the past. It is possible that in conversations with coaches, judges and administrators who have a lot of past experience with producing high performance gymnasts, their knowledge of past occurrences could be as valuable as the information derived from scientific testing.

Circulating the Test Results

Once the gymnasts were nationally ranked by NZG, the scores were then posted to the coaches to inform them which of their gymnasts had passed the test. I observed an amusing incident in one club where a new high performance coach had only arrived in New Zealand a few days before these results were posted. She received these results but was completely unable to translate them, as the pieces of paper simply had the gymnast's name and a number. It was assumed that the coaches would already have the pre-circulated manual and other information which would allow them to translate whether the numbers next to the gymnasts' names meant they had passed. The coach or the club then had the job of circulating this information to the gymnast and their parents.

This particular point of circulation is the most difficult for the coaches and administrators. Every coach or administrator involved with the PAT/DAP test has experienced at least one parent who has reacted unhappily to the results of the test. Parents are reported or observed to have abused coaches, lost their temper, broken down in tears, quit the sport, written vitriolic emails or even smashed into a club administrator's car because they were upset that their child was not accepted into the high performance programme. As Dolores, an administrator describes, many parents desperately want their children selected into the high performance stream, regardless of the consequences:

I think that the majority of people simply want to be able to say that little Suzie has been 'selected'. Look at (parent name). They didn't care that (gymnast name) was coached by a 15 year old with no coaching experience and that she was only training 7 hours a week. They took all their glory from the fact that she had been selected... (Different parent name) couldn't give a damn as long as (different gymnast name) is allowed to stay in Stage 3. She doesn't care that she is coached by a crap coach. The only thing that worried her was that she should be allowed to stay in Stages²¹. (Dolores)

²¹ Stages are the names of the High Performance stream grades competed in rhythmic gymnastics.

As Dolores describes, the other aspects of the high performance assemblage appear to be of little interest in comparison with the reward of being selected into high performance. If the child is accepted however, it is the beginning of a long life of selection procedures, which are described later in this chapter.

2006 Onwards, Beyond PAT/DAP

Possibly one of the topics of greatest interest to coaches and administrators was speculating on the most effective classification and sorting systems for gymnastics in New Zealand and criticising the PAT/DAT test. As described earlier in this chapter, many coaches and some of the sports science literature argue against the PAT/DAP test, claiming that there are numerous examples of the test resulting in the most successful gymnasts not being selected for high performance. For example, Matthew failed the PAT test numerous times and competed in the levels stream below the high performance stream but persevered and eventually passed and became one of the few gymnasts in New Zealand to reach the finals in several international competitions. The reverse has also occurred, where gymnasts had bodies very close to the ideal and therefore scored highly in the tests, however due to them missing other components crucial to the high performance gymnast assemblage, they were not very effective high performance gymnasts. For example, Bridget was one of the highest scoring gymnasts in the DAP test in the country and had a body extremely close to the ideal form. However, because Bridget lacked mental toughness and economic support, she was a highly unsuccessful high performance gymnast. Gymnasts were also given mixed messages. For example, Michelle passed the DAP/PAT test every year it was offered, yet was excluded one year from the high performance squad on the grounds that her gymnast assemblage did not include the correct appearance. Two years later, without passing any further tests or trials, Michelle was permitted to compete in high performance again.

Another example was given by Jessica, a women's gymnastics coach, who discussed the implications of the introduced PAT test in women's gymnastics by comparing the women's gymnastics 2002 and 2006 Commonwealth Games teams. She explained how the 2002 team was not required to pass a PAT test yet still finished in the surprisingly high position of 4th. Immediately prior to the 2006 team's departure for the games Jessica described:

Well the squads are getting smaller, I mean there's only a few kids... When (name) and (name) started there were 28 in the Commonwealth Games squad... 2000 that was, two

years from Commonwealth Games which was 2002. And then they ended up with 12 trialling and now we're down to five seniors and that's it.

Roslyn: So what happened?

Jessica: We let a lot more kids in a few years ago. And they didn't all make it, but the ones who did had to really fight hard to stay there. The likes of (name), she wouldn't get into a programme now, her basic posture's just, well, if the whole thing was redone she wouldn't have done it. They just opened the floodgates for a while and I think it actually did work, the 2002 team did quite well. So it will be interesting to see now, how we go. Even though some of the kids weren't up to standard. When (name) trialled in 2002 she was not anywhere near standard, but they were always nipping at the heels of those who are... Then she went on 3 years later to World Champs. (Jessica)

The 2006 team that Jessica was curious about finished in 7th place a few months after this interview, a very disappointing finish in comparison with the 4th place achieved in 2002. Jessica's explanation was that the PAT caused the number of gymnasts in the high performance squad to drop dramatically. This, in turn, lessened the motivation of the top gymnasts in the squad to work hard and resulted in a less successful team. It appears from Jessica's example that allowing any gymnasts to compete in high performance, rather than requiring they pass a test, had the result of creating a more successful gymnastics team.

Meg, a rhythmic coach, agreed with Jessica that larger numbers of gymnasts, even without ideal physical attributes, motivates gymnasts to work harder and this improves the team's overall performance: "Kids like (name) won't win junior international but will sure as hell give everyone else a run for their money." Anna, a women's gymnastics coach, agreed with Meg by describing how in the USA and Russia the large number of gymnasts competing in elite and hoping to be selected for the national team caused the top gymnasts in the country to work much harder to keep their places.

In 2007, rhythmic gymnastics decided to alter their testing system to reflect the concept of competition results being a better indicator of future success than the DAP test. Instead of the gymnasts being required to take a DAP test, they were now required to trial to be in high performance. The top eight gymnasts from the trial were selected into the high performance squad. The reasoning behind this decision was that since the DAP test so rarely predicted the top gymnasts and since the point of gymnastics is to compete, then base the test around competition results. One result of this change was some gymnasts who had previously failed the DAP test were now able to compete in high performance. It also had the effect of having a far larger number of gymnasts competing in high performance, however, the standard of the

high performance events was not particularly high. A wider range of bodies also competed in 2007, with the DAP test previously excluding many body types. As this was only in place for one year, it is impossible to reflect on the effectiveness of this system in comparison to the DAP test, however there were cases where Jessica's theory appeared to be borne out. For example, in the senior competition, athletes who had always passed the DAP test were up against an athlete who had never passed the DAP test. Although the latter athlete knew that she was not really of the right calibre to be high performance, she was an excellent competitor and ensured that the other more talented athletes were highly motivated to work hard to try to beat her.

Overseas Comparisons

Many of the coaches involved in elite gymnastics in New Zealand had spent time living and working in other countries and investigating their alternative classification systems. Several coaches argued for introducing systems very different to those in New Zealand. They frequently criticised the practices in New Zealand and cited examples of other countries' systems as superior.

One coach described how in Canada, a classification system was used that considered physical ability, but also allowed coaches to take other aspects of a gymnast into account in choosing whether to put them in high performance. This coach described:

...there are many different clubs that act as a feeder. So they have rec(reation) and they have provincial stream and they don't have international kids. So they feed their top kids to try out for the high performance centre which is basically a fitness test and then we do look at their results as well and we do look at finances, parents, whatever drive. If you see a kid that didn't score that well on the test but you want them, you can do that because it's your own club. So there were three coaches that ran it and that was it. Maybe it sounds dodgy but it's the best way. (Meg)

This coach argued that because the coach is an important part of the assemblage that must work with the gymnast on a daily basis, the coach's opinion on the gymnasts as well as other factors were as important a factor in the gymnast assemblage as physical abilities. This is an opposite view to that given by NZG, which adopted the position that coaches were unreliable as selectors of gymnasts and must be replaced by the more objective sports scientists.

Another coach described how in the UK, high performance is purely results based with gymnasts receiving financial rewards for excellent results:

If your results are going down, you're going to receive less, if your results are going up, you'll get more. It's performance based. You're allowed injury time and rehab time, all that's taken into consideration. They'll say you'll have so many weeks grace or whatever, but then there's someone that oversees that. That money from the lottery commission goes to the, it's still government based, it goes to the national office. The national office then allocates to who they see fit for the potentials. You can have local/regional grants as well if you're on the borderline. (Liam)

Anna described how in the USA, a PAT test is used, however the large US population makes it far more effective. She explained that they have a PAT testing where approx. 2000 gymnasts get tested and around 700 are selected into the elite stream. As a result, there are 700 gymnasts all 'pushing against each other' and creating competition. By contrast in New Zealand, there are usually only about five to ten gymnasts selected, which is not enough to create a strong competitive culture.

Amy, a coach, used the example of Germany to agree with Anna in arguing that large numbers of athletes all fighting for places in the team is an effective method of raising the standard of a high performance group:

In Germany they have different tiered levels of a high performance programme. You usually have to go in at the bottom level of it and you have to compete in certain competitions and gain a certain score and be of the best, like there's only allowed to be say eight in each level. And it works really well because there's so many people. So you're constantly fighting. Like being in the All Blacks. You're constantly fighting for your place and you know some little whippersnapper is coming through to push you out. So they're always pushing them along... It helps with their consistency, it helps with everything. It's only these comps, you must go in these comps and you must perform. And they do, because they have to. (Amy)

Natalie, a coach, described the Australian aerobics system for selecting athletes to send to international competitions as easier to work with from a coaching and planning perspective than the New Zealand system of having gymnasts trial for each competition:

The selection system is different in that they select athletes into a squad, and then from that squad, they tell the athletes which competitions they're going to, so they don't have to qualify for every competition. They have performance tests to show they're fit to go. The big advantage of that... is that they know which competitions the kids are going to the whole year. So the parents know how much money they need, when they need it, they can do fundraising, because they can get letters saying this child has been selected for this tour. Whereas in our case, we've got a selection meet on the 18th Feb for a tour that's happening on the 14th April. It's not enough time. It'll be beginning of March before selection letters go out which means trying to get sponsorship or funding – it's not long enough. So from that point of view it's difficult. From the point of view of a coach, it's difficult trying to periodise athletes' training programmes. I'd love to know exactly which competitions the different athletes are going to. I mean, I've got three athletes trialling for two spots. They'll all get to go somewhere because we've put something in place which says 1 and 2 will go to these competitions and numbers 3 and 4 will go to these competitions, with priorities to go to these competitions... But it's difficult because I can't plan the year for those athletes because I don't know where they're going to end up going. So that becomes very difficult from a coaching perspective. (Natalie)

SPARC frequently acknowledges that one of the difficulties with implementing any of these overseas systems in New Zealand is the lack of government funding and the smaller population in New Zealand. Bowker and Star (1999, p. 321) also warn of “trying to emulate a distant perfection that on closer inspection turns out to be just as messy as our own efforts” instead emphasising that classification systems can be flexible and constantly evolving and can create potential opportunities for change. There appears to be a tension between copying other systems that appear more effective, and understanding that the system may not work as well elsewhere as the assemblage in one country may be different and unique to the original country.

The Next Level of Selection

Once gymnasts are selected into the high performance stream they then compete in a variety of systems. Women's gymnastics athletes, although pronounced high performance, compete in the same competitions as non-high performance gymnasts called levels 1 – 10 before becoming old enough to compete in junior or senior elite. In rhythmic gymnastics, the high performance gymnasts aged 9 – 12 compete in separate grades specifically created for high

performance development called Stages²². Similarly, in aerobics, the high performance athletes compete in their own age group stream. In men's gymnastics, the gymnasts sit half way between the two systems, competing together with non-high performance gymnasts in New Zealand but competing in high performance competitions in Australia²³. In all codes, once progressing through these competitive systems for anything from two to eight years, the gymnasts then compete in either junior or senior elite. From there they can be selected to represent New Zealand at various international competitions. In almost all cases a qualifying mark is set which must be met by the gymnasts either at a specific trial, or during a specific period of time at any one of a number of sanctioned competitions. However, the details of the selection process vary from code to code and competition to competition.

Following the Artistic Gymnastics 2006 Commonwealth Games Selection Process

The first step in selecting the gymnasts for Commonwealth Games was to create a qualifying mark that the gymnasts must achieve. In both men's gymnastics and women's artistic gymnastics, the Commonwealth Games includes a team competition, an individual competition and individual apparatus competitions. Kevin, a judge, described how the team was the most important consideration and that the qualifying mark was set based on what other competing teams were achieving:

We first and foremost want to select a team. We would tend to put the team score of say Australia and Canada to one side because they're another level. We try and target ourselves around Malaysia, South Africa and probably England, from a team point of view. We go out in the year of competition and establish what the team score would be from those countries. We set a team figure that we would strive to achieve. And that team could be made up of 5, 4, 3 – you put up 5, 4 compete on each apparatus and 3 are selected. We base our team around that. (Kevin)

Kevin described how there could be from three to five gymnasts named in the team. For each of the apparatus, four of the five gymnasts compete and the top three scores are counted as the

²² Prior to 2004, Stages 1 – 4 existed in women's gymnastics and rhythmic gymnastics. Stages 1 – 4 consisted of routines designed specifically for young pre-elite competitors aged 8 – 12, developed and still competed in Australia. In women's gymnastics the Stages were eliminated due to the lack of gymnasts competing. In rhythmic gymnastics, Stages 1 and 2 were removed as unnecessary, with only Stages 3 and 4 being competed in 2006, 2007 and 2008. But in 2009, some clubs opted to compete in Stage 2 again.

²³ New Zealand has traditionally used the same rules and requirements as Australia for the national stream gymnasts in preference to writing their own and New Zealand gymnasts regularly compete in Australia under these rules.

team scores. By calculating these marks, qualifying marks could be set. The gymnasts were then given several months and range of competitions in which to achieve these marks. In both men's gymnastics and women's gymnastics, NZG decided the optimum would be to select a five member team of gymnasts who had met these marks at one or several of the sanctioned competitions.

The network of Commonwealth Games is more complicated than World Championships because Commonwealth Games is a multi-sport event. In terms of selection, this means that the selection of gymnasts into the Commonwealth Games team must be ratified by the NZOC. As Kevin described, NZG must create the criteria for gymnastics, choose their selected gymnasts and then make a case to the NZOC for their selection:

The team for Commonwealth Games, because it's a multi-sport event, you have to put forward a case for your team to NZOC. Now that group of four selectors will sit there and they know nothing about gymnastics, they know nothing about cycling, they know nothing about equestrian! They might have their pet passions, but they know nothing. So you've got to go to them with a really solid case for why you want to submit these five people as a team. So we say this is how we picked them, this is where we believe they will sit at the moment, as a team. We have picked these individuals because, and then you move on to the all around and the individual apparatus and their expectations of medallists. It's got to be all transparent and up front. They've got to be convinced that you haven't just juggled²⁴. (Kevin)

For women's gymnastics in 2006, the NZOC agreed with NZG's recommendation of a team of five gymnasts. At the time, there were only five gymnasts competing in women's gymnastics at the senior elite level and they were all selected into the team.

Men's gymnastics had a different outcome. Mike, a men's gymnastics coach, described how the NZOC disagreed with NZG's recommendation of hoping to finish in approximately 5th place. Instead, the NZOC argued that the men's gymnastics team should be aiming to finish in the top 50% of the field. Mike argued this made a qualifying score very difficult to work out as they did not know how many teams would be competing at Commonwealth Games:

²⁴ By "juggled" Kevin refers to the potential for sports' committees to provide misleading data to the NZOC which would allow scores to be set lower and potentially allow more athletes from their sport to attend.

Where we had, for example, the guys were initially coming 5th team or better, they changed it to getting in the top 50%. I didn't agree on that totally. Well, I didn't agree on it at all because when it comes to the time, how do we know how many teams there will be? We don't know if there's going to be 6 teams in it or 16 teams. So my argument is that I know that 5th is at a certain standard, round Scotland, Wales, those sorts of countries and I think that's the sort of standard we should be in amongst. So it would have made more sense to say that, rather than have a mark where you don't know what it is till very close to the date. (Mike)

The NZOC also decided after looking at the scores the gymnasts had achieved, that only four gymnasts were required in the team. A member of NZG at the time argued that the NZOC did not understand the 5-4-3 format described above and therefore considered it only necessary to send three gymnasts. NZG had tried to explain that in gymnastics there are a great number of variables and they needed more than three gymnasts. The NZOC eventually decided to send four gymnasts, leaving NZG to make the extremely tough decision to choose four out of five athletes. The athlete who was not chosen quit the sport on the day the decision was announced, with his coach and parents both believing that an injustice had been done. Neither team performed as hoped, with the women's team finishing 7th out of 10 teams and the men finishing 8th out of 9 teams.

Following the 2005 and 2007 Rhythmic Gymnastics World Championships Selection Process

Rhythmic groups represented New Zealand at both the 2005 and 2007 World Championships. Throughout 2005, the selection process for the World Championships was still being refined. The group was required to perform at a number of trials but the decision as to whether they would be selected was not made until very close to the championships with there being a lot of confusion about how the team was selected. Mary, a rhythmic coach, described her own personal frustration with the lack of a specific plan or information:

Lots of terrible things happened this year. Yes, lots of terrible things have happened this year in the group! I screamed and screamed and screamed, but I've just given up, they just won't listen. They just keep putting them on another trial and won't tell them what's expected of them. They will go into a trial situation but not get any marks. They wouldn't know what they had to achieve. There was never a plan of like, well, we're aiming for World Championships so you've got to trial here, here, here and here. And

they couldn't always tell the marks because of the change of Code²⁵. So they would go back on last year's, but the Code was different so you can't do that. Just so bad! And I hurt quite a lot inside because it was so unfair for these girls, just so unfair. If you do it fairly then they either get in or out, they don't achieve it or they do. And of course that meant that by having all these masses of trials all the time, the coaches couldn't have a down time to lift the difficulty level, or strength or flexibility. The periodisation was absolutely hopeless. (Mary)

While NZG decided this group was allowed to compete at the 2005 World Championships, no member of the group or their coaches seemed to have had any idea of what selection process was used to decide they could compete.

In contrast to 2005, a very definite plan was put in place for the 2007 World Championships. In 2007, there were two high performance rhythmic groups training, one from Christchurch and one from Auckland. It was agreed that both groups should travel to different World Cup competitions²⁶ and the decision about which group would represent New Zealand at World Championships would be made both on their results at their respective World Cups, and from a trial between the two groups at a particular designated competition in July. Before the groups could travel to the World Cup however, they needed to trial within New Zealand to confirm they were up to the standard of a World Cup event. Some of the judges and coaches felt that these trials were a waste of time as each group was given several chances over the two day trial to achieve the scores and judges were encouraged to judge generously to ensure the groups would meet the scores. As will be discussed in more detail in chapter seven, it was also argued that the New Zealand judges judged so differently to those overseas that it was impossible to compare the scores received in New Zealand with those achieved at an international World Cup competition. This became particularly apparent in the July trial. After both groups had competed in the World Cup competitions in Europe, the Christchurch group disbanded owing to several of its members sustaining injuries. This left the way clear for the Auckland group to compete at the World Championships, however they still needed to perform at the July trial and achieve a sufficient score to show they were of a high enough standard. At the July trial, the group was given a score lower than what they achieved overseas at the World Cup several months earlier. Several coaches and judges argued that this was because the New Zealand judges were judging harder than the World Cup judges. The

²⁵ Mary refers to how the Code of Points is updated after every Olympic Games. In this case, owing to the Code being rewritten after the 2004 Olympic Games, scores from 2004 could not be compared to those in 2005.

²⁶ In gymnastics, World Cup competitions are not the large competitions that occur every four years such as in soccer. Instead, every year there are a number of World Cup competitions.

coaches of the squad argued that in receiving lower scores, it would be difficult for them to convince GSNZ and SPARC that they should attend World Championships as their scores suggested they were not improving throughout the year. As in the case of the Commonwealth Games, the group needed to convince GSNZ that they were worth sending to the World Championships. In this case, after the rhythmic administrators in the country argued their case, the group was confirmed as competing at the 2007 World Championships where they improved on the performance of the previous New Zealand group from 2005.

Following the 2005 and 2007 Trampoline World Championships/World Age Games Selection Process

The World Championships for trampolining include a sideline competition called the World Age Games. This competition allows young trampolinists to compete in a world age group competition. Therefore while in the other codes all members of the team must be competing in the Senior Elite or Open division to attend World Championships, in trampolining a joint team is sent which includes Age Group athletes and Open athletes. One result of this is that unlike in the other codes, almost all the trampolinists in the country over 10 years of age attempt to qualify either for World Age Games or World Championships.

In both 2005 and 2007 trampolining used a method of setting a particular qualifying mark and then setting a qualification period during which athletes must score the qualifying mark twice at two sanctioned competitions in order to be eligible to attend the Championships. The criteria described how to create a sanctioned competition, including a minimum number of highly qualified judges present. Although there have been occasional accusations of foul play, in general this system seems to have worked fairly effectively for selecting a team with the teams performing as well as hoped at the World Championships.

Amy, a trampolining coach and representative of the trampolining technical committee, described how the mark was chosen:

There's a criteria that lately has been based on top half of the world. So Worlds results from the previous couple of years averaged out and 50% taken. So if there were 40 in the level then the 20th placed person's score is put into our team selection for World Champs. (Amy)

Amy went on to describe how when this criteria was introduced it was seen as somewhat contentious, with several coaches arguing that it was too hard: "Everyone kicked up a huge

fuss because when they first looked at the score, five people in the country would have been in.” However, she argued that it provided motivation for coaches and trampolinists to work harder and that a year later, fifteen trampolinists made the mark. Other coaches and administrators have agreed with Amy’s logic, arguing that the system of raising the qualification mark is an effective method for raising the standard within the country.

Conclusion

In following the trajectory of a high performance gymnast in New Zealand, the step of classifying the gymnast as high performance is an important and necessary one for the gymnast to compete at the international level.

In order for a gymnast to be classified as high performance, a gymnast must be enrolled into a competitive programme by their parents which contains a fully set up gymnasium and high performance coach. They must also be identified as talented and mobilised to take and pass whatever test the national body requires. Within each of these processes are a range of influential actants. Parents of the gymnasts have the power to impact whether a child is originally enrolled in gymnastics and in which code and whether they are mobilised to take the test. Parents are found to translate the invitation to compete in high performance as either highly desirable or highly undesirable, depending on how they view the training demands of the code. Coaches are empowered to pre-select children for the test, and as members of the technical committees, to influence the selection of exercises in the test and how they will be conducted. Once the test has been taken, sports scientists enrol a number of non-human actants such as video cameras and measuring tapes which determine the scores received by the gymnasts taking the test. NZG then translates these from ‘raw’ scores showing, for example, how many chin ups a gymnast performs, into a score that determines whether the child is able to compete in high performance.

The power of NZG is apparent in the way that the test became a requirement of entry into high performance despite many of the coaches, including many who were on the technical committees disagreeing with the need for a test. This chapter describes a range of arguments by coaches who gave examples from New Zealand and internationally to demonstrate that passing a physical ability test does not necessarily result in international success. As Terral, Collinet and Delalandre (2009) point out, controversies are an important part of any scientific discipline as part of the search for truth. This chapter shows how sport is no exception, with the existence of the test, the form the test takes and the way the test is taken all revealed to be controversial and debated.

Similarly, controversy was found to exist between different actants in choosing gymnasts to represent New Zealand. In the Commonwealth Games selection, there was disagreement between NZG and the NZOC about the make up of the team. In rhythmic World Championships selection, there was discussion over the value of a trial with only one group, and whether the marks awarded at the trials were even accurate. In trampolining World Age Games selection, many coaches disagreed with the technical committee in setting a high qualifying mark.

This chapter also reveals how non-humans mediate the testing process through providing objective measurements that are perceived as more fair and reliable than those given by humans. The translating of the test was found to include a range of non-human actants such as video cameras and stop watches. In line with the ANT emphasis on non-humans as actants, the following chapter continues down this pathway in specifically examining gymnastics training, with particular attention to the non-human mediators and actants that are enrolled into the training gymnasium.

Chapter 4

Training and its Many Mediators

...if we stick to our decision to start from the controversies about actors and agencies, then *any thing* that does modify a state of affairs by making a difference is an actor – or, if it has no figuration yet, an actant. (Latour, 2005, p. 71)

The creation of a routine which conforms to the requirements set out by the Code of Points generally involves a long and arduous training process. The gymnastics apparatus are not easily assembled with the human body in the ways demanded by the Codes of Points. The training process includes not only the body, the apparatus and the Code of Points, but a number of other mediators introduced in order to assist the body to work more effectively with the apparatus and thereby create more successful gymnastics. This chapter describes the gymnastics training process with particular attention to the mediators that have tended to be erased from other accounts of gymnastics but, it is argued here, are crucial to its creation. Accounts of the gymnast outside of the gymnasium emphasise the gymnast as a school child, or a daughter, or a friend. However, several of these accounts stop following the gymnast as he/she enters the gymnasium door, and only return when he/she leaves the gymnasium several hours later (see for example, Donnelly, 1993; Johns and Johns, 2000; Weiss, 2000). Only Varney (2002) acknowledges the importance of the gymnastics apparatus in women's gymnastics; however as described in chapter two, attention is focused on the gendering of the sport through the apparatus as opposed to the process of producing gymnastics. As Law (2004, p. 5) describes, the network that produces an actant is often concealed from view. This chapter proposes to remedy this erasure in gymnastics through focusing on the period within the gymnasium, describing the actants that work in the production of gymnastics. Just as Michael (2000, p. 117) examines what he terms the "Hudogledog": the assemblage of dog + person + a lead, to trace the circuits of communication that may otherwise remain invisible in other heterogeneous accounts of dogs and animals, this chapter examines the competitive gymnast as the assemblage of body + apparatus + Code of Points to trace gymnastics.

This chapter asks the question: how is a gymnast created through training. It is through the practice of training that the body, apparatus and movements come together to create gymnastics. As Lloyd (2004, p. 562 original italics) describes about the practice of becoming a swimmer, the body becomes a gymnast "*in-the-practice*" of gymnastics training. The training process reconfigures the body into becoming a gymnast through repeatedly performing and perfecting movements that are gymnastics.

In following the network of gymnastics training, the relationship between the supposedly micro world of training and the supposedly macro influence of the FIG is explored, revealing connections between the two areas without any need to separate them. The role of the coach is also considered, with the focus not exclusively on the coaches' authority and power but rather notes the importance of the coach in translating and interpreting the rules into a gymnastics training programme. The power relations between different actants, and the power different actants hold to shift and change the network, is described.

While following every branch of the gymnastics network is beyond the scope of this thesis, this chapter will focus on some of the dominant actants within the network for the creation of gymnastics, with particular attention to those actants or mediators that the human actors describe as significant. When describing which actants to include in the following process, Latour (1995) argues that the relevant actants are easily visible as these are the things and people that literally 'act' or 'make things happen'.

Training Hours

Elite gymnasts in New Zealand train anything from 6 – 32 hours per week, depending on their code and programme. Typically, artistic gymnasts train at least 30 hours per week, six days per week and very often twice per day. As described in the introduction, artistic gymnastics is the most dominant type of gymnastics in New Zealand. Not only is it the most famous and popular, but it is also perceived to be an excellent sport for all-round body development as it incorporates the teaching of the six dominant movement patterns²⁷ which are relevant for all sporting practice. As a result, beginner level programmes in gymnastics focus extensively on artistic gymnastic skills. Another result is that the network of gymnastics often involves a gymnast beginning in artistic gymnastics, regardless of what code or sport they eventually compete in. Because of the variety of physical skills learnt in artistic gymnastics, it is possible for a gymnast to begin in artistic gymnastics but then compete successfully at a high level in a different code, as several New Zealand gymnasts have done.

Tricia, a coach, in discussing all the different codes, described: "Artistic is definitely at the extreme where basically they don't do anything else except train." Participants in the other codes are keenly aware of the larger number of hours required for success in artistic gymnastics compared with the other codes. The greatest contrast is with trampolining or aerobics which, as described in chapter eight, in general involve training far less hours than artistic gymnasts, most likely because these codes require the mastery of far fewer apparatus and a smaller range of movements, as Amy, a trampolining coach, argues:

²⁷ These are: Spring, Rotation, Landings, Swing, Static and Locomotion.

There's less equipment. There's really one, that's it. So you can spend, I don't know, how many pieces of equipment are there in gym? 6? So you can spend a quarter of the time and get as good, and so you don't have to spend the hours and hours and hours that they do. (Amy)

Both Tricia and Amy highlight the way time is constructed differently in each code. In artistic gymnastics, training is constructed around the idea of cramming as many training hours as possible from as early an age as possible, with the aim of producing a gymnast who is able to compete at the top level by their mid teens. For artistic gymnastics, the goal is to make time pass as slowly as possible as the gymnasts try to learn skills as quickly as possible before they grow larger. As chapter two described, the pressure to achieve and train hard has led to a negative perception of the sport which has been focused on extensively in the literature.

Training in all codes is configured through the combination of the apparatus and the rule book. In terms of the apparatus, the physical properties of the equipment used can impact on the way training operates. For example, the physical shape of the trampoline is such that trampolining is only effective if only one person is on the trampoline at a time. Therefore even if a gymnasium manager wishes to timetable 10 children in a trampoline class for purposes of profit, it is impossible to do this if there is only one trampoline.

The significance of the physical properties of the equipment also becomes apparent through examining the timing regulations in the rule book. The Code of Points specifies how many apparatus include a time limit for a competitive routine. Time limits are specified for all the floor exercise routines performed in men's, women's, rhythmic and aerobics. The other apparatus do not need a time limit specified because they either use an alternative form of measurement or they are limited by the capacity of the human body. For example, on uneven bars, pommel horse, rings and high bar, there are no routine time limits, instead there are rules restricting stops and pauses, because it is extremely difficult to keep moving for any length of time on these apparatus. In trampolining, time is set by the number of bounces (10) in a routine. Therefore the physical ability of the body to keep moving on the apparatus limits the length of the routines and precludes the need for a time limit.

Time limits, or the lack of, configure how training operates. For example, routines which have a set time limit require gymnasts to complete as many high scoring elements as possible in the short time available. Therefore the goal of training is for the gymnast to learn to compress time, to 'fit in' all the elements they can. Specialist choreographers are often enrolled by coaches or gymnasts as they are experts in creating routines that compress time most effectively. As rhythmic and aerobics both include only these types of routines, where music is set for a particular length of time and the gymnast must perform as many high scoring elements as possible in that time and in co-ordination with the

music, training in these codes emphasises the ability to move to music within the designated timeframe.

Rhythmic gymnastics includes a time limit for all routines. For individuals all routines are a maximum of 90 seconds long while group routines are 150 seconds long. As a result, all routines in rhythmic gymnastics during the 2005 – 8 competition timeframe were designed with the goal of ‘packing’ as many difficulties into the time limit as possible to achieve a high score. Gymnasts who could move fast and therefore complete a high number of difficult elements scored higher than those who moved slowly.

As a result of this arrangement, teaching gymnasts to move quickly has become highly important for New Zealand rhythmic coaches. Barbie, a gymnast, noted how expectations of moving with speed had become much greater in comparison with 15 years ago:

I was watching on video this morning the 1993 World Champs. It was slower, there was time to do all your moves, time to do all this handling, but now it’s like move after move after move, you have to do like 18 moves. (Barbie)

Just as Zerubavel (1982) describes how there are an infinite number of temporal frameworks that a person may call upon, this quote describes how the temporal framework for rhythmic gymnastics has altered over the last fifteen years. The time limit has shifted from a background requirement to one that can potentially restrict the scores achieved by gymnasts if they do not move fast enough. With the increased need for speed, the ability for a gymnast to move fast has become one of the indications of their ability to succeed. There are several gymnasts who although their work is very good, struggle to move at a fast enough speed to fit all the movements in their routine that they can and therefore do not score enough to perform well internationally.

The change in speed of movement in routines over the last fifteen years has also reconfigured the type of music used by rhythmic gymnastics. A decade ago, rhythmic music tended to be slow and graceful, whereas now it has moved to having a much faster beat with many gymnasts using music with a strong rock style beat. For example, in the past there was very little crossover between artistic and rhythmic music because artistic music was far faster to complement the acrobatic tumbling runs. Now, however, frequently the same pieces of music are used in both codes. Rhythmic coaches who are ex-gymnasts often lament the loss of the slow music that they used when they were gymnasts.

Coaches who have worked overseas suggest that New Zealand needs to reconfigure their training practices in order to incorporate the teaching of fast movement. One coach who spent time watching training in Eastern Europe recalled how she observed 6 – 7 year old gymnasts being taught highly

complex choreography at high speed purely to learn to move fast. The emphasis was on their speed of movement rather than performing perfectly. She contrasted this with New Zealand, where young gymnasts are taught to perfect individual skills and given very simple routines. Yet other coaches argue that New Zealand does not spend enough time teaching the basic techniques correctly, and rush the gymnasts into learning difficult skills in order to achieve high scores. This is typical of the types of controversies between coaches, who have different beliefs in what should be emphasised when teaching the sport.

When describing the codes, participants often use the word “artistic” rather than differentiating between men’s and women’s artistic gymnastics because all gymnasiums in New Zealand which run elite artistic gymnastics programmes include both men’s and women’s with resources shared between the two. For example, elite gymnasts will commonly train on the same floor area and the same vault, whether women or men, while both will occasionally use the other’s apparatus in another way to assist in their training. For example, women’s gymnasts often enrol the men’s high bar. The men’s high bar is made of metal and is very thin and slippery, while the women’s bar is made of wood over fibreglass and is thicker and more textured. The female gymnasts literally tie their wrists to the men’s high bar with ‘straps’ which can slip around the metal bar but not around the wooden bar, in order to practise movements in a way where the body cannot fall from the equipment. As described further in this chapter, resources are also shared between codes in the gymnastics clubs which cater for more than one code.

All the gymnastic codes take place in an indoor facility, owing to the non-waterproof nature of much of the apparatus. For example, the parallel bars, uneven bars and rings are made of wood over fibreglass which absorbs water and creates a slippery and unworkable surface when wet, so could not be housed in an environment that includes rain. Similarly, many of the matting surfaces for all codes would incur damage if out in the rain.

Training the Body: Format of Training Sessions

When a gymnast first starts training, s/he begins to learn to enact a gymnastics body. At the beginning, the gymnast is inarticulate. Latour (2004, p. 210) defines an inarticulate subject as one who “whatever the other says or acts always feels, acts and says the same thing”. In being inarticulate, the beginner gymnast has not yet learnt “to be affected” (Latour, 2004, p. 210) by gymnastics, such as by what the coach says or what the apparatus does. For example, a coach may say “straighten your legs” and the gymnast will not straighten their legs. In order for the gymnast to learn “to be affected” the coach will undertake particular tasks to teach them. For example, a common task to teach a gymnast what ‘straighten your legs’ means is to sit a gymnast down with her legs out in front of her and make her legs straight for her, then ask the gymnast to close her eyes so she can feel what ‘straighten your

legs' means. In this way, the gymnast becomes articulate and able to be affected by what the coach says. She can now use her body to straighten her legs when asked. Similarly, the gymnast must learn to be affected by the apparatus. For example, when a rhythmic gymnast begins, she may only be able to throw and catch the apparatus if the apparatus is in a particular position, such as a rope being knotted. However, as she becomes more experienced, she learns to be affected by the position of the apparatus and able to catch it no matter what the position. She has learned to enact the rhythmic body, able to respond to coaches, judges and apparatus on demand.

In order to teach the body to enact gymnastics, the general format for a training session is similar in all codes. Apart from some aerobics classes, which are discussed in more detail in chapter eight, the gymnasts almost always train in a group of about 4 – 12 gymnasts of a similar level, although often within the group the gymnasts will also have individual training programmes. The gymnasts begin with some type of aerobic warm up which usually involves running and very often jumping or skipping. Immediately after is usually another 'warm up' or 'stretch' which consists of a set number of active and passive²⁸ stretching exercises. Following this, there is usually some form of conditioning or 'basic skill' work performed. In artistic gymnastics this will always involve some type of handstand training, such as holding handstands for one minute or handstand walking in different directions, in rhythmic it would usually involve simple ballet moves and in trampolining it would involve basic somersaults. There may also be basic strengthening exercises included such as holding particular positions or shapes. This part of training varies extensively depending on the type of gymnast being assembled and what movements are going to be most useful for their particular make up. Each gymnast-body is a different assemblage of muscles which make it more or less suited to different skills, and in most cases the individual gymnastics programmes will be designed around whatever that particular body assemblage needs to work on. For example, in one gymnasium, a group of rhythmic gymnasts included two very flexible gymnasts and five partly flexible gymnasts, therefore the flexible gymnasts were directed to spend less of their time stretching to develop flexibility and more time on strengthening exercises, while the less flexible gymnasts were required to spend a great deal of time stretching and less on strengthening.

This part of training can take anything from half an hour to two hours depending on the plan for the session. The remainder of training typically takes place on the apparatus themselves. Whether the coach has all gymnasts working on one apparatus or all on different apparatus varies extensively depending on the network of that gymnasium. The placement of the apparatus, the type of apparatus

²⁸ Passive or static flexibility is the range of motion around a joint during a passive movement such as sitting in splits. No voluntary muscle action is required; the stretching is performed through gravity or a partner pushing. Active or dynamic flexibility is the range of motion during active movements and therefore requires voluntary muscle action. It may include exercises such as kicks or holding the leg in the air (Baechle and Earle 2000, p. 323).

being used and whether there are other bodies working in the gymnasium will determine how it is used.

Another factor in the training process is the time of year. Zerubavel (cited in Adam 2004:107) argues that the calendar can be seen as an “expression of culture”. In gymnastics, the calendar determines how training is organised, how much time is spent on particular movements and skills depending on how soon a competition is approaching. If there is a large competition in the near future, gymnasts will constantly perform full routines on the competitive apparatus. For example, one month before the 2006 Commonwealth Games, the women’s artistic gymnasts in one gymnasium were required to perform a certain number of routines on each apparatus every day²⁹. By contrast in periods well before the next competition, the gymnasts will be practising a greater number of individual skills and learning new skills that they may put into their routines in the future.

Conditioning: Strength and Flexibility

Training in all the gymnastic codes includes some component of strength and flexibility training. The code with the greatest emphasis on strength training is men’s gymnastics, with all the apparatus and the requirements listed in the Code requiring a great deal of strength. A typical men’s training session includes a far greater percentage of strengthening work than the other gymnastic codes. Often, half the training session will be spent on some form of conditioning. Conditioning can include exercises such as sit ups or chin ups, or more apparatus specific exercises such as dips on the parallel bars. In one gymnasium, the athletes played a tape that repeatedly played 1 minute of music followed by 15 seconds of silence to do their conditioning. The coach had given them a set of leg exercises involving various kinds of jumping and sprinting. Each athlete would begin on a particular exercise, perform it for the duration of the one minute of music, then have a rest during the silent 15 seconds before beginning the next exercise when the music started again. They completed this set of exercises twice without stopping which took about 20 minutes, before collapsing sweaty with exhaustion. In another men’s programme the athletes would train twice a day: one session was a conditioning session while the other focused on skills and routines.

Just as men’s artistic gymnasts spend a large proportion of their training time on exercises to develop strength, rhythmic gymnasts generally spend a similar time on flexibility. While in artistic, the warm up stretching time will usually take around 20 - 30 minutes, in rhythmic one hour would be more usual with the training session also including specific flexibility exercises, both active and passive.

²⁹ The number varies from apparatus to apparatus because while performing 10 vaults in a row is relatively easy, performing 10 floor routines in a row would be very time consuming and usually unrealistic in a single training session.

The flexibility exercises involve the introduction of a number of mediators. The coaches enrol their own bodies to physically stretch the muscles and there are a variety of ways the coach may push or pull muscles in order to create flexibility. For example, the gymnast may kneel in front of the coach facing the same direction of the coach and the coach may lift one leg up to the front and past the gymnast's head while pushing the gymnast's hips forward with their knees. One of the ways a rhythmic gymnast needs to be particularly flexible is in the splits position, with top international gymnasts routinely demonstrating a 200 degree or more split position in the air, as shown in the picture below:



Fig. 4.1 Anna Bessonova at the 2007 World Championships. FIG (2007) Retrieved from www.fig-gymnastics.org

To obtain this position, rhythmic gymnasts stretch in splits with their front leg raised on a box, beam or chair and their back leg remaining on the floor. The gymnasts may sit in this position for one to five minutes.

Stretching with one leg up as described above develops passive or static flexibility, however, rhythmic gymnasts must also develop active or dynamic flexibility. A number of mediators may be introduced to develop active flexibility. The most common is the ballet bar. In many gymnasiums in New Zealand ballet-bars are placed around the rhythmic floor for the gymnasts to practise on. The ballet-bars are used for the gymnasts to practise a variety of balletic movements with a particular emphasis on leg holds and kicks which are fundamental to the creation of active flexibility and imitate the movements made by rhythmic gymnasts within their routines.

Active flexibility is also developed by two mediators which are used around the ankles: therabands and ankle weights. Therabands are rubber bands about 10cm wide and 1 – 2m long which are commonly used by physiotherapists, yoga teachers and fitness teachers. In rhythmic, artistic gymnastics and aerobics, they are used in a variety of ways to develop active flexibility. They may be tied around the ankles and worn while performing kicks or they may be held around the foot when the foot is pointed and flexed to develop strength in the feet. Ankle weights are used similarly, tied around the ankles and then worn for kicks and jumps. In one gymnasium, the ankle weights were combined together with the trampoline, where the gymnasts would wear ankle weights and then perform all the jumps in their rhythmic routine on the trampoline.

The Choreographic Process of Assembling a Gymnastics Routine

In all codes, the ultimate demonstration of the gymnast is the performance of the gymnastics routine. Gymnastics in all codes on all apparatus involves the creation of a routine that assembles the body with the equipment, often using a variety of mediators, in a way that includes the movements as set by the FIG through the circulated document called the Code of Points. The routine must also comply with the specific way time must be quantified for that apparatus. As previously described, many apparatus, such as all floor exercise routines performed in men's, women's, rhythmic and aerobics include a time limit for a competitive routine. Therefore the goal of training is for the gymnast to learn to compress time, to complete as many high scoring elements as possible in the short time available. Specialist choreographers are often enrolled by coaches or gymnasts as they are experts in creating routines that compress time most effectively and receive high scores. By contrast, in trampolining, time is set by the number of bounces (10) in a routine. In trampolining, clock time of a routine becomes a measure of success. The longer a routine takes, the more successful the athlete is most likely to be because that means they will have been bouncing higher and therefore able to complete a larger number of twists and turns in the air than their competitors.

The assembling of the routine is the fundamental job of the coach, who as described later, may enrol others to assist. Coaching can be defined as a constant process of assembling routines where movements are added, deleted or substituted, as is described in the below example of the creation of a women's artistic floor routine. This example demonstrates the typical choreographic process which occurs in order to create a gymnastics routine.

An elite women's floor routine will contain at least three or possibly five rows of tumbling, where the gymnast performs a row of connected acrobatic elements. The goal is to create the most difficult tumbling rows which the gymnast can do well, which will result in the highest number of points. Tumbling rows are constantly updated as the gymnast learns to perform harder movements, and easier movements are substituted for harder ones. For example, where a gymnast one year may perform only

a double somersault, a year later her double somersault may have been substituted for a double somersault with a full twist, which is worth more points. Alternatively, the movements performed before or after the double somersault may be changed, so that instead of performing only a handspring prior to the double somersault, a somersault may be performed. Training is a constant process of adding and substituting.

As well as tumbling, the women's floor routine also includes leaps, jumps and turns which the gymnast can score points for. As with tumbling, these will be updated constantly or assembled together differently as the gymnast learns new, higher scoring movements.

When creating a routine, the coach or enrolled choreographer must include all the tumbling, leaps, jumps and turns that will give the gymnast the highest score, but they also must assemble them together in a pleasing fashion and match them together with music. The choice of music and the kinds of dance movements to be included are dependent on the gymnast assemblage. For example, the body may be one that has studied ballet and therefore classical music and balletic movements may be chosen for the routine as the body has the skill to move in a balletic way that would suit classical music. Whereas if the body is one that has studied jazz dance then jazz music may be chosen instead.

The choreographer of the routine is also dependent on the gymnast assemblage. Some gymnast assemblages include large amounts of money, in which case an expensive, professional choreographer may be flown in from another part of the country to create the routine. Other gymnast assemblages may have choreographers within their normal training environment who will create the routine for free. In several cases in New Zealand, rhythmic gymnastics coaches are enrolled by women's gymnasts to create the routine as they are often perceived to be superior choreographers³⁰.

The creation of a routine may take one hour or many. Choreographers describe how sometimes the routine flows out of them and takes little time to perfect, while at other times it is a struggle to find the right movements to make an effective routine. Choreographic sessions often involve the choreographer saying to the gymnast "try this movement" and then if it does not look right, substituting it for another movement. They will try different combinations of movements and differing orderings in order to create the best effect. Like the creation of many innovations, it is a trial and error process of attempting many different assemblages until the most effective one is found.

Music as a Part of the Assemblage

³⁰ Rhythmic gymnastics has more intensive requirements for demonstrating music interpretation, and further, rhythmic gymnasts must perform four routines to music, while women's artistic gymnasts only perform one. Therefore, rhythmic gymnastics coaches must choreograph four times the number of routines and demonstrate better interpretation of the music, hence the perception they are probably superior in creating routines that incorporate music.

In women's gymnastics, rhythmic and aerobics, music forms a vital part of the gymnast assemblage. In these codes, training includes the gymnast practising moving in time with the music. In rhythmic and women's gymnastics, ballet movements are commonly performed in time with the music to develop this skill. In aerobics and rhythmic, the music is also broken into 'counts' which the routine is choreographed around. In rhythmic group training and aerobics, the gymnast will commonly practise their routine as much to the sound of the 'counts' either by the coach or themselves, as with the music. Dierdre, an aerobics coach who was previously a women's artistic coach, described how counting was the 'basic skill' of aerobics:

If you were coaching the little five year olds at gymnastics you'd get them all to do a forward roll. In aerobics, you'd have to get them to do a count of eight. I think counting is great and I don't understand why you don't use it in gymnastics, it's marvellous! If a kid knows that on count two they have to be here – duh!! (Dierdre)

The aerobics Code of Points demands that the gymnasts move very fast on particular beats in order to achieve high scores. As a result, the speed of the music becomes an actant in the creation of a good routine. The highest marks are obtained by routines performed to music with a very fast beat or count. Harriett, an aerobics athlete, described how in aerobics the gymnasts adjust the speed of their music in order to learn to move faster:

It's the same music but the counts are faster... And we start with the slowest one, then once that's too slow we get a quicker one so we move faster... It looks more intense... But when you're doing it you are really aware of the speed, it's so much harder. (Harriett)

Harriett described how in aerobics training, the slowest music will be used when the routine is first being learnt, but as the assemblage becomes more effective, the routine can be performed faster, which will lead to better marks. Harriett's description demonstrates how although there is a limited time in aerobics for completing a routine, the goal is to try to fit as many skills as possible into the limited time, both for an "intense" effect and to achieve more points.

The choice of music and the acquiring of a suitable piece can absorb vast amounts of time and money. Gymnasts and coaches spend hours listening to possible music choices from recordings or off the internet in order to find what they perceive to be an appropriate piece of music. At the first competition of the year, there is often great disappointment if a gymnast discovers that a rival is using the same music so finding unique or 'new' music is considered highly desirable. Once chosen, the music must also be cut to the correct length or else the gymnast will receive a judging deduction, which usually involves the enrolling of a specialist with the correct computer software to do this job and, again, this can be very expensive.

The Coach as Mediator

In his autobiography, Lance Armstrong (Armstrong and Jenkins, 2003) describes how much of his training occurred with only the assemblage of his body, the bike and the road and only minimum contact with a coach. This is contrary to what is described in many accounts of sport, as in most high performance sport, the coach is deemed to be a crucial figure in the quest for sporting success. In all the gymnastic codes, the coach is a highly central figure. As a UK report on worldwide 'best practice' in high performance sport argues: "Coaching is central to the development of excellence... In search of the best possible coaches some sports have recruited and employed coaches from abroad." (DCMS, 2000, cited in Green and Oakley, 2001, p. 260 -261). All the gymnastics codes in New Zealand have some coaches who have been "recruited and employed from abroad". Many have been imported from the Eastern bloc, originating from traditionally dominant gymnastics nations such as Russia, Belarus, Uzbekistan, Romania and Bulgaria, although coaches have also been employed from Canada, England, USA, Japan, Holland and Argentina. These coaches generally make up over half of the coaches employed in high performance gymnastics in New Zealand. All are employed by individual clubs who have recruited these coaches through advertisements or international connections. Many clubs agree with the DCMS report with regard to the importance of the coach in producing successful gymnasts and view acquiring an expert coach as a large step towards success.

Historically in New Zealand, coaching was primarily a voluntary activity, often undertaken by physical education teachers. Grant and Stothart (1994) describe how during the 1960s and 70s, school teachers began to reject the task of coaching sport in their own time, finding it too burdensome and the involvement of teachers in sport began to reduce. In gymnastics over the last decade, there has been a steady erosion of voluntary coaches as it becomes more and more difficult to sustain gymnastics clubs purely through voluntary effort. While many aspects of gymnastics, such as competitions, are run almost entirely through voluntary effort, coaches are now predominantly paid as the role has become professionalised (Abbott, 2008). Whitson (1989, p. 443) observed the same trend in Canada, where he described an increasing number of professional coaches being employed with an orientation "towards international standards of excellence." In New Zealand, gymnastics clubs now generally consist of paid professionals including coaches and sports administrators, together with assistance from volunteer parents. While parents continue to provide voluntary assistance such as fundraising or helping at competitions, volunteers are increasingly unlikely to be prepared to take on professionalised roles such as those of coaches and administrators. Instead, parents appear to prefer to enrol their children into private clubs that employ paid staff. Hayes (2006) notes how sports consumers, such as parents of children enrolled in sports, are increasingly more demanding in requiring higher standards of facilities and results. This was borne out in New Zealand, where in Christchurch in 2006, a small voluntary club with a very long history was forced to close as they

found their gymnasts were opting to attend one of the three much larger clubs that had opened in Christchurch, all of which employed full time paid coaches. As a voluntary club, they could not compete either in terms of results or facilities with the larger organisations in the same area.

Acquiring an expert coach is further deemed important owing to the many hours gymnasts train and the amount of time the coach and gymnast spend together. It is common for gymnasts to spend as much time with their coach as with their parents. One coach in New Zealand described her sadness when a gymnast retired after a 12 year career as the coach felt she had been like a mother to the gymnast after working with her almost every day since she was only 5 years old. Coaches are often judged by parents on their ability to 'look after' their children/gymnasts as much as on their ability to produce results. In Hochschild's (2003) terms, the role of the coach includes an expectation of performing emotional labour for the child gymnasts under their care. For example, one administrator described how if she had a young daughter, she would want her to be coached by a particular coach despite his results not being the best in the country because she perceived his care of his athletes to be exemplary.

In all the gymnastic codes, the coach is a crucial figure, present at all training sessions. While many other sports include the expectation that athletes spend time practising on their own, in gymnastics gymnasts are often advised never to practise outside the gymnasium, usually with the explanation that they may not be practising the correct technique.

In Barker-Ruchti's (2007) study of a group of elite Australian women's artistic gymnasts, she devotes a specific section to the coach/athlete relationship. She entitles her section on the coach/athlete relationship as "do as you're told" (Barker-Ruchti, 2007, p. 208) and interprets the style of coaching adopted by the coaches in her study as hierarchical and militaristic. Barker-Ruchti (2007, p. 209) presents the coach as the dominant figure and the gymnasts as adopting the subservient role, showing little resistance to this unequal relationship: "The gymnasts I observed did not seem to be dissatisfied with their lack of decision-making power. Instead, they appreciated the disciplining training methods and trusted their coaches' expertise." Only minimal resistance to the training regime was observed by Barker-Ruchti, in the form of one gymnast crying and arguing.

In New Zealand there were many gymnasiums where a similar authoritarian relationship appeared to exist. The most commonly observed relationship was for the coach to be an authoritative figure who directs all the assembling within the gymnasium much like the coach Wacquant (2004, p. 55) describes in the Woodlawn boxing gym. Wacquant describes DeeDee, as reigning over the gym with "iron discipline" through dictating specific rules and practices that he insists are followed. Brohm (1978, p. 107) suggests that sports training can resemble an assembly line with the coach acting as the "boss" and the body being "Taylorised" in being taught to avoid all unnecessary movements, a

metaphor which can be aptly applied to many gymnastics training sessions. Like a “boss”, the coach attempts to constantly monitor all the gymnastic bodies under their direction at all times. One way that they monitor the progress and achievements of their gymnasts is through logbooks or wall charts. Several coaches were observed to ask their gymnasts to keep logbooks where they recorded how many of each skill they have practised each day, how many were completed perfectly and other information the coach imparted to them. In a typical training session in many gymnasiums, gymnasts were observed to write in their logbooks every few minutes to keep track of their training. Coaches also used whiteboards or wall charts to write up the names of their gymnasts and their achievements.

Unlike in Barker-Ruchti’s (2007) study, in New Zealand there were numerous examples of different gymnasts assemblages that did not incorporate an authoritarian demeanour as part of the gymnastics network. Gymnasts often opted to change their gymnastics network by discontinuing training under that particular coach if the behaviour of the coach did not conform to their wishes or desires. There was one gymnast who trained and competed for six different clubs over the four year fieldwork timeframe as she would leave each club if she felt the coach was not coaching her effectively. Other gymnasts were observed to: quit the sport entirely, change from one code to another, issue a complaint to the coach’s employer, argue with the coach in the gymnasium or complain to their parents who then met with the coach to discuss the coach’s treatment of their child. There was one gymnasium in New Zealand where the culture seemed identical to that described by Barker-Ruchti (2007). The coaches here adopted a highly strict, authoritarian manner, frequently screaming at the gymnasts and demanding perfect work at all times. In contrast to Barker-Ruchti’s (2007) observations, the gymnasts at this gymnasium did not accept this behaviour as a necessary part of their gymnast assemblage, instead this gymnasium experienced a constant stream of gymnasts quitting, leaving the sport or moving to other clubs.

Other coaches were observed to use variations on the authoritarian style, such as rhythmic coach Meg. Meg described having a very high level of control over her gymnasts. She described how she generally controlled as many aspects of their training as she could, including the leotards they wore and the music they used. For example, she described: “I pick all the music for my kids, I cut it, give it to them and yeah, they don’t really have a say in their music.” In this example, Meg displays similar behaviour to the coaches described in Barker-Ruchti’s (2007) in insisting on control over the gymnasts’ choices. Like the gymnasts in Barker-Ruchti’s study, Meg’s gymnasts trusted their coach and accepted her decisions as an effective and useful part of their gymnastics assemblage.

While Meg and other coaches did act in a way that conformed to the discourse of coaches needing to be in complete control of their gymnasts, many coaches in New Zealand deliberately constructed a coaching role quite different from that which Barker-Ruchti (2007, p. 212) describes as “coach

authority, boundless repetition, punishment and toughness”. In Barker-Ruchti’s (2001) study, the coaches reinforced these discourses on a daily basis. In New Zealand, many coaches chose not to behave this way. For example, one New Zealand coach of Eastern European extraction refused to ever raise his voice while with his gymnasts, believing in rewarding gymnasts for good work rather than punishing them for errors. A rhythmic coach deliberately did not require for her gymnasts to be thin in her fear of causing any form of eating disorder. In trampolining, the majority of coaches did not use firm discipline, believing instead in creating a culture more orientated around fun than discipline, as described further in chapter eight. These coaches were aware of the criticisms of gymnastics as described in chapter two, and were either nervous of being similarly criticised or genuinely believed that a harsh and controlling manner was not conducive to either gymnastic or future life success.

The coach can be described as the ‘inventor’ of the gymnast assemblage. To ‘invent’, the coach must not only have the knowledge of which movements the gymnasts must practise in order to complete high level routines, but must also have the skill to translate the Code of Points into a routine. Chapter seven follows the practice of judging, which involves the routine being translated by a judge, through the Code of Points, into a number. By contrast, the coach works in the opposite direction, by translating the Code of Points into a gymnastics routine.

If a coach is particularly brilliant at translating the Code of Points, it is possible that they can directly impact on the Code of Points. For example, coaches spend a great deal of time reading the Code of Points in order to search for the easiest moves that are worth the highest value. Although after every Olympic Games, the Code of Points is reviewed, sometimes movements that are not very difficult end up being awarded high numbers of points. When this happens, coaches inevitably train their gymnasts to learn these movements, which results in all gymnasts in the world performing the same skills. Often the result is the next update of the Code changes these movements to being valued lower in response to coaches all interpreting the Code the same way. However, coaches can also be unusually clever at interpreting the Code to the point where they create original movements. The first gymnast to perform a movement at the World Championships has it named after her/him, and if it is a particularly spectacular movement, the gymnast may become famous for performing it. For example, one of the coaches in New Zealand is Aliona Polozkova, who was the top ranked gymnast in Belarus in women’s gymnastics from 1995 – 2001 and ranked in the top 20 in the world over this period. Aliona was the first gymnast in the world to perform a particular vault at the 1997 World Championships and as a result, that vault is named the “Polozkova”. Although she never won any medals at World Championships or Olympic Games, she remains famous for being the first to perform this vault.

The majority of decisions about how the Code should be interpreted and which bodies and which components need to be assembled together are made by the coach. The coach possesses the most knowledge about the best way to do this and gymnasts and parents often consider the coach to be the most important actant in the creation of the gymnast assemblage.

In artistic gymnastics, there is often a literal assembling taking place with mats and other gymnastic equipment being moved around the gymnasium to build towers of mats or other structures to assist with training. Artistic coaches sometimes joke that their job is only to move this equipment around every day. The equipment needs to be moved to create particular formations that will assist the gymnast assemblage to work together more effectively without the body getting hurt. For example, large soft mats referred to as “crash mats” are moved under equipment to ensure that if the body should fall from the equipment, it will land safely.

The coaches also often use their own bodies as learning mediators to prevent injuries in much the same way as the crash mats. Coaches routinely “spot” or “catch” a gymnast when a movement is being attempted for the first time, or if a gymnast is not yet strong enough to perform the movement unaided. Spotting involves the coach holding parts of the body or equipment in the correct place to enable the gymnastic movement to occur. For example, in artistic gymnastics and trampolining the coach may literally lift the body over and help it land safely when a somersault in the air is performed for the first time. Similarly, on uneven bars, one of the most common movements is the cast to handstand, where the gymnast pushes off the bar to reach a handstand. This movement is difficult to learn to control perfectly, so the coach will assist the gymnasts many times before they will be able to safely perform it unaided.

The necessity to spot requires the coach to include muscles as well as knowledge to be an assemblage of elite coach. Some coaches in New Zealand routinely lift weights to stay strong enough to be able to lift the bodies of their gymnasts. Others joke that it is this spotting that keeps them fit and strong. Part of the knowledge of an elite coach is also how to spot. Coaching courses in New Zealand include teaching coaches how to spot difficult moves and explain where to put the hands and where to lift.

Given that spotting requires the coaches to place their hands on the body of the gymnast, it is an act which most coaches realise must be dealt with carefully. There is always the possibility of the hand/s slipping, whether intentionally or not, to a part of the body that the gymnast does not want touched. Weiss (2000, p. 195) argues that the need for coaches to spot and physically manipulate their athletes leads to a worrying domination of the body. However, the strength of this argument has been such that strategies have been developed to avoid any potential abuse. For example, New Zealand Gymnastics developed a stretching policy which advised coaches how to safely stretch gymnasts in an appropriate manner. Some coaches also have their own strategies to protect themselves from being accused of

inappropriate behaviour. For example, there are several male coaches who refuse to stretch their female athletes, instead delegating the job to a female coach.

However, another way that coaches may render assistance without putting themselves at risk is to delegate the job to a non-human. This is also highly effective as in many cases, the coach's body is actually unsuited to spot the gymnast and there is a non-human mediator that may perform the action more effectively.

Non-human Mediators

All training centres include other pieces of equipment that the athletes will never compete on that are used for training purposes. These items are crucial to the creation of gymnastics as the assemblage of person and equipment. The gymnast is an immensely unstable assemblage that can easily fall apart and leave either the person or the equipment in a state of disrepair, such as on uneven bars where the person can fall off the bars, or the bars themselves can potentially fall over. Therefore, non-human mediators are introduced to assist this assemblage to work properly. As Latour (1995) describes, the skill of opening or closing the door can be performed either by a human or by a door hinge, with the hinge, as the non-human, proving the more reliable of the two as it is not subject to getting bored or tired or having other time constraints. In following the gymnast around the gymnasium, a number of mediators were encountered which are highly reliable.

These mediators can also act as mechanisms for time compression within a training session. Wajcman (2008) notes how many technologies are introduced into the workplace with the aim of improving efficiency and the same occurs in the gymnasium. As described below, technologies may be introduced which substitute for the coach and allow gymnasts to practise repetitions of certain movements without having to wait for the coach to assist them.

In gymnastics, different coaches will use different objects or their own bodies to mediate depending on what creates the most effective assemblage. In many cases, the hands of the coach are the most dexterous and skilful, however in other cases, the hands can be substituted by a belt or similar device, such as in the below picture.



Fig. 4.2 Rings training device. Janssen Fritsen (2008). Retrieved from www.janssen-fritsen.com

This rings device literally holds the body in place so that the muscles can perform the move even if they are not yet strong enough to perform it on their own. These devices are particularly useful when the body may be in a position that is difficult for the coach to reach, such as in the following picture.



Fig. 4.3 A gymnast and coach using a harness on the uneven bars, over a foam pit. Janssen Fritsen (2008). Retrieved from www.janssen-fritsen.com

This harness device is often used when the body needs to learn to fly high into the air. There is great potential for the body to land incorrectly or miss the perfect landing zone, particularly on an apparatus like the uneven bars as above shown, where the bar is very small and therefore difficult to catch. This harness system is anchored to the roof through a pulley system with the harness around the waist of the gymnast's body. The coach pulls on the rope to force the body higher and lets it go to let the body drop. On the trampoline, the harness is commonly used as a method for the gymnast to receive assistance even while high in the air, although there are varied arguments about its usefulness. For example, a trampolinist, Kay, described how the feeling of the harness is so different to normal trampolining that she did not feel it is a useful tool: "it was not that great because it doesn't give you the same feel as when you bounce by yourself. You can't really go that high. So it's not that useful." Several gymnasiums have harnesses suspended from the ceiling of the gymnasium and they are used occasionally for the first time/s someone learns a new move. One coach described how harnesses could be extremely useful when trampolinists needed to move from performing double somersaults to

triple somersaults because a triple somersault requires much more aerial awareness³¹ and therefore carries greater potential for injury than a double.

In artistic gymnastics, the alternative to a harness is to pile up what are known as “spotting boxes”. These are polystyrene boxes about 60cm high, 1.2 metres long and 1m wide, covered in plastic created for the sole purpose of being stable platforms for the coach to stand on while “spotting” the gymnast. If the gymnast is working on the high bar, a coach may pile three spotting boxes on top of each other in order to reach the athlete’s body and be an effective part of the assemblage. These are useful in artistic gymnastics as the boxes can be moved around the gym when required, in contrast to a harness which needs to be fixed to the ceiling.

The assemblage of the apparatus and the Code of Points means that trampolinists and artistic gymnasts work high up in the air. When flying through the air, there is the problem of ensuring that when the body separates from the equipment and lands back on the floor, the body lands safely. Although the mats, such as “crash mats” under the apparatus are softer than a wooden floor, they are hard enough that it is possible for the body to get hurt should it land in an incorrect position. In aerobics, this problem is amplified as aerobics takes place on a wooden floor. Harriett, who used to compete in artistic gymnastics, described how “you get a lot more bruises” in aerobics because the floor they compete on is made of wood in contrast to the sprung and matted floor used in artistic gymnastics. One example of countering the “anti-programme”³² (Latour, 1991) “hard floor” was in one club where the aerobics floor was set up in an artistic gymnasium. The aerobics competitors would alternate between practising on the hard wooden floor that they must compete on and on the much softer and bouncier artistic gymnastics floor. The coach explained that if the athletes did not do this, they would run the risk of becoming injured:

I use sprung floors for training. I can’t have 13-14 year old girls doing free falls on the wooden floor every day; we’d have injuries all over the place. And the clubs that do train just on the wooden floor sustain quite a high number of injuries. (Natalie)

The ultimate solution for preventing landing injuries is a device called the “foam pit” which is also shown in the above picture, and is utilised in all codes apart from rhythmic.

³¹ This is the term used in gymnastics to describe the ability to know where you are in the air. A good sense of aerial awareness is particularly important in trampolining as trampolinists spend so much time in the air.

³² As described in chapter one, an “anti programme” is any set of arrangements that prevent an occurrence from happening in a particular, often planned or expected, way (Latour, 1991). In this case, the coach planned for the athletes to learn a particular set of movements, however, the floor is so hard that they cannot do this without becoming bruised. Therefore, the hard floor is referred to as an “anti-programme”, as it prevents training from occurring as planned.

Within the history of artistic gymnastics, it is argued that the development of the foam pit was part of a huge revolution in gymnastics (Kerr, 2003) as it allowed the gymnast to attempt new skills with a much greater guarantee of safety. It is deemed a crucial actant in the creation of artistic gymnastics and trampolining and is included in the gymnasiums of every club in New Zealand that produces elite gymnastics. The foam pit allows the gymnast to land in almost any position without getting hurt and mediates the learning process. It also counters one of the most dominant anti-programmes in trampolining and artistic gymnastics: fear. Every trampolinist or artistic gymnast and coach agreed that fear is a significant component of the gymnastics training process, for example:

Roslyn: Do you ever get scared of anything in gym?

Malcolm: YES. You get scared a lot.

Damien: I guess I get scared of the odd skill. I don't think I'm an overly fearful gymnast. There's some more fearful gymnasts out there.

Fear is created because the gymnast assemblage includes assembling in ways that are high flying, dangerous or risky. The gymnastics network includes the Code of Points as a crucial actor in determining the way that the gymnast assembles and the Code of Points awards high marks to gymnasts who perform risky or dangerous elements which are very scary for the human to perform.

Coaches spend hours working with gymnasts to combat their fears. Some gymnasts described very simple strategies to overcome fear, such as: "Try and avoid it and then at the competition just throw it!!!" (Malcolm) or "Just chuck³³ it and see what happens." (Phillip). Sometimes a sports psychologist may be enrolled to assist with countering fear, as will be discussed in more detail in chapter six.

Women's gymnast Eva, by contrast, describes how certain pieces of equipment, such as the foam pit and other mediators, were introduced in order to counter her fear of a high flying move she performed on uneven bars:

I'd do it over the pit, and then it got to the point where I had to do it on the single bar over the hard mats and I wouldn't do it there (because of being too scared to begin with), then when I did that I'd have to do it on the double bars... (Eva)

For Eva, although the foam pit was effective in countering the fear of performing the scary move the first time, she still had to overcome her fear of performing it under competition conditions. Eva's

³³ To "chuck" a movement refers to giving the element a try without a great deal of thought about technique, and just hoping that it will work ok. It is a derogatory term. In Australia in the 1980s, I remember coaches referring to visiting New Zealand gymnasts as "chuckers" as an insult.

story includes a description of the process of learning to produce an uneven bar routine safely and how the foam pit was used to assemble her bar routine. Eva described how she learnt on a bar over the pit first, and then moved to the next step, a single bar. Obviously, working on a single bar instead of the uneven bars means the lower bar is not present. This means that there is no possibility of the low bar interfering with the performance of the skill that in this case only requires the high bar and the person and it means the full use of the high bar's ability to swing the gymnast can be made. The addition of the lower bar means a different, less efficient swinging technique must be used, so it is more effective when learning a skill that only requires the high bar for the gymnast to practise without the low bar. I also observed how the next step, once the skill could be performed on the single bar, could be to try it on the uneven bars but with a soft mat over the low bar to prevent potential injury should the body hit the bar, although Eva states that she went directly to the uneven bars.

One coach described how, in learning a new skill, he was surprised to find how much more confident his gymnast was over the foam pit. When the gymnast was attempting the skill on the single rail as he would need to during the competition, he was shaking with nerves, but over the pit he was completely relaxed. The coach had decided to spend much longer with that gymnast practising over the pit than he normally did with other gymnasts in the hope that it would counter the anti-programme of fear.

Latour (1991, p. 104) observes how programmes can become more and more complex as they respond to anti-programmes. Jessica, a coach, described how she changed her strategies over time by introducing a wider range of possible mediators to counter the anti-programme of fear. She referred in her description to a habit of "balking" that some gymnasts develop. On balance beam, it involves gymnasts standing on the beam and thinking for a long time before performing the skill they are supposed to, because the fear of performing it leads the gymnasts to freeze. They may not even actually perform the skill at all. "Balking" also commonly occurs on vault, where a gymnast will begin running towards the vault and either come to a halt or run past it because they are too scared to attempt the vault. Jessica described how she added more mediators as programmes to counter the fear anti-programme. On beam, she described using a lower beam or the floor as a mediator in countering fear which was more effective and reliable than spotting:

It comes down to psychology of coaching a lot though. I was at another club the other day and I watched a kid balk a flick layout, probably did two out of eighteen. And I just thought this child's in the wrong place. They need to be on a lower beam or on the floor or whatever, this is ridiculous... I have not had a problem with a girl for years. I have not had a kid stand on a beam and do all that "I'm not going, I'm not going, I'm not going" because probably about five years ago I completely changed the way I coach beam... It was (name) who said to me actually, I was saying about how much spotting is required on beam, and she said "I haven't spotted at beam

for years. I made this conclusion that if they won't get up and do it straight away, then they're not ready to do it and I'd take them back a step." And so I think a lot of fear is coaching. You get the odd kid who is just a real wuss. Like you get kids in the school programme who are too scared to do a forward roll! There are children out there, who are just really scared, but normally they don't do a gymnastic programme, they just stay in it to get some confidence.
(Jessica)

Jessica chose to focus on fear as the dominant anti-programme she is concerned with countering, however another anti-programme that often occurs in gymnastics is the design and condition of the apparatus. The importance of creating the most effective assemblage for gymnastics is described by many gymnasts and coaches, who are focused not only on creating a useful body, but upon creating strategies to make the assemblage work together more fluidly. Malcolm, one of the youngest interviewees, described how the assemblage can vary due to location and how he had developed some strategies for ensuring that good gymnastics is still produced despite the apparatus varying considerably from gymnasium to gymnasium:

Malcolm: The high bar is always different, bouncier or harder. And the rings, sometimes they shake more.

Roslyn: Is that the same here? When you compete at (another club) is it different?

Malcolm: At (another club) the high bar is a bit bouncier than I like it, and the rings, the rings are pretty good actually. The floor's a bit harder than here, so you can get a bit more bounce if you put more into it.

Roslyn: So you know what to expect? If you got sent to the US or something I guess you'd be thinking, "I wonder what I'll get here?"

Malcolm: Yeah, because you get used to the floor you train on every day. If you have a soft floor at home and go to a hard floor somewhere else, you end up going "oh no!" And some floors are really bad, they're soft on the top and hard underneath and you end up tearing your achilles and stuff.

Roslyn: So you never know! I didn't know there was so much variation.

Malcolm: After training so much on a single apparatus you get to notice the little changes.

This excerpt from Malcolm's interview reveals his awareness of how his body must assemble fluidly with the equipment in order to produce good gymnastics. He has learnt how to "be affected" (Latour,

2004, p. 210) by the apparatus. His comment about the bounciness of the high bar makes it clear that he realises a certain amount of manipulation of the equipment is required to produce optimum results but that the type of equipment directly affects what he must do. He is aware that his gymnastic routine will only occur if he manages to work as an assemblage with the equipment and describes how he “puts more into” the floor in order to make a harder floor work more effectively, an example of how he has developed a strategy to overcome the anti-programme of a too-hard-floor. Another athlete, Matthew, described how a too-hard-floor anti-programme is usually overcome through athletes arriving at a competition several days before the competition commences, giving them time to train on the equipment for a few days and no longer be affected by it.

Malcolm’s quote also reveals the disparities in gymnastics equipment. Although there are regulations about the type of equipment that must be used at international competitions, athletes describe great variation between particular pieces. This influences the most effective assemblage that needs to be created and how gymnasts may introduce other mediators into the assemblage in order to create more effective gymnastics. On uneven bars, high bar and rings, gymnasts commonly add hand guards, chalk, water and other substances to the assemblage to mediate between their body and the equipment. Gymnasts often use a particular mix of chalk and water to create a particular grip on the bar, or they may even add an unorthodox substance such as honey or coca cola to create an even more sticky grip. Gymnasts were observed to carry jars of honey onto the competition floor with them to prepare the equipment. These substances allow the body and the bar to work together to create a routine. Wacquant (2004, p. 128) describes similar mediators in the world of boxing, such as the addition of a “dry sponge” under hand wraps to cushion the impact of repeated punching. Matthew explained how these actants can be as important as the basic equipment in creating successful gymnastics. He described how his “guard”, which is like a fingerless leather half-glove, caused his production of gymnastics to go badly wrong:

...my first comp back wasn’t brilliant, but my guard kind of sent me flying off the high bar which wasn’t entirely my fault. They were relatively old guards and I quite liked them but they’d got really smooth and slippery and I was just slipping off in giants and stuff. I usually replace them fairly quickly but I was in the stage of swinging in a few pairs and I just thought I’ll go back to the ones I like, but it didn’t work too well for me. (Matthew)

In Matthew’s case at this competition, the assemblage broke down owing to his “guard” literally breaking down. Matthew insisted that it was not his fault, but the fault of the hand guard which was as important a part of the assemblage as both Matthew and the high bar. For Matthew to perform perfectly he required his body, the high bar and the hand guards to all work together equally effectively and mistakes can come about if any of these three parts of the assemblage fail. Following

the hand guard further, the hand guard is also an assemblage of leather, velcro and rubber which requires all these parts to function in order to work effectively.

In trampolining it is the body that needs to be held together during complicated twists and turns in the air. Trampolinists need to create very tight tuck or pike³⁴ positions in order to rotate fast enough to complete multiple somersaults that involve the hands grabbing onto the legs to hold them close to the body. Chalk is introduced into the assemblage in order to make this 'grabbing' process work more effectively and mediate between the hands and legs to prevent them coming apart. When teaching young children somersaults in the air, the children are often required to put a piece of foam or clothing between their chin and chest, or between their feet, with the goal of completing the somersault without dropping the foam. Holding the foam ensures they are unable to move from the correct position.

In artistic gymnastics, the separation of the gymnast body from the apparatus is something to be avoided at all costs. A fall of this nature will result not only in a lower mark, but the potential for injury. The importance of not falling and keeping the assemblage functioning is described by Eva, who jokingly gave the lack of potential for falling as her reason for enjoying floor: "My favourite apparatus was probably floor... floor there was nothing you could fall off. You could fall on the floor, but not fall off!"

The aim of avoiding the enforced separation of the body and the equipment is not limited to artistic gymnastics. It is just as undesirable in the code with the most unstable apparatus of the five: rhythmic gymnastics. While artistic equipment is designed to remain still and only move a little when worked upon, the point of rhythmic gymnastics is for both the person and the equipment to be in constant movement. Deductions are received if any part of the gymnast equipment hybrid stops moving throughout a routine and points are only awarded if the entire hybrid is working as movement. For example, the gymnast achieves no points for performing a movement unless the equipment is also performing a movement. Because the equipment is not fixed, there is an emphasis on using both the body and the equipment in creative ways. The equipment is required to be thrown in the air and swung around within a routine, with the most unstable apparatus, ribbon and rope, also required to create certain patterns during the routine.

Rhythmic equipment is so unstable that its instability can prevent gymnasts from performing their routines at all. For example, at the 2006 New Zealand National Gymnastics Championships, one gymnast found a knot had formed in her ribbon part way through her routine. She was then forced to spend the majority of the rest of her routine unpicking the knot. Her apparatus could not perform the

³⁴ Tuck position is when the legs are bent and knees drawn in towards the chest, in a ball like shape. Pike position is when the legs are straight and the body leaning forward in a nose-to-knees bend.

routine and, as rhythmic gymnasts are only allotted 90 seconds to complete their routines, she was unable to perform most of her routine.

Unsurprisingly, this gymnast's mother was very upset by this incident as it lost her daughter the national title. Afterwards, the mother proclaimed: "I'm going to burn the bastard! She didn't deserve that!" meaning she was going to burn the ribbon for doing this to her daughter. This gymnast's mother referred to the ribbon as an equal part of the creation of the routine and in this case, the part that was at fault and should therefore be punished. She attributed no blame to her daughter, but was very angry with the ribbon. The mother also recognised that a significant part of success in gymnastics is developing strategies to try to stabilise the assemblage of person and equipment. She described how she had discussed with the coaches various methods to stabilise the assemblage such as spraying the ribbon with hairspray or starching it. These methods are designed to stabilise the ribbon slightly to make it perform the routine more effectively, but not so much that the ribbon can no longer move fluidly.

Another gymnast: Barbie, expanded on the strategies used to create a more effective assemblage of person and ribbon, and the instability of the ribbon, by focusing on an anti-programme with the potential to disassemble the assemblage, the weather:

Barbie: When it's raining it's just horrible. They get stuck and knotted and urgh.

Roslyn: If a comp is like today (raining), you mean?

Barbie: Yes. The ribbons just knot and tangle and get stuck.

Roslyn: They must be so absorbent!

Barbie: They are.

Roslyn: What are they made of?

Barbie: Silk. You have to keep on ironing them.

Roslyn: I was wondering about that, before competitions you always sit there with ironing boards?

Barbie: Yes. (Another gymnast) is usually the ironer!!

Roslyn: At nationals do they have iron boards set up?

Barbie: You have to take your own. B.Y.O. We forgot our iron for going to Worlds so we had to get (our coach) to bring a travel iron over. But recently I've started using my hair straightener and it's actually quite good.

Barbie's comments demonstrate how manipulating the apparatus to be in perfect condition before competing is highly important to the rhythmic gymnast. In this case, it is the addition of an unwanted actant: water, into the ribbon that creates the problem, acting as an anti-programme (Latour, 1991). The iron or hair straightener acts the part of a programme designed to counter the effects of the humidity soaking into the ribbon. Similarly, at the New Zealand National Championships in 2006, during the apparatus finals for ribbon, all the doors for the stadium were closed and spectators asked only to leave the stadium between routines because drafts through the hall were affecting the performance of the ribbons.

Other apparatus use similar mediators. For the apparatus hoop, tape is introduced into the assemblage to mediate between the hands and the hoop. The tape is wrapped around the hoop to counter the anti-programme 'sweat' which could potentially disassemble the hybrid. Taping the hoop creates a surface that more easily allows the person to hold on to the hoop and keep the assemblage whole, and also improves the appearance of the hoop. For the apparatus ball, the shape of the ball may be altered to make it more effective. Rather than requiring the ball to be fully pumped up as is desirable in ball sports, rhythmic gymnasts prefer to have a ball that is as flat as possible in order to hold and work with it more effectively. Elite rhythmic routines often include the ball being held in unexpected places on the body such as in the back as in the photo below:



Fig. 4.4 Kimberley Robson, competing at 2003 NZ National Championships. Photo supplied with permission by the family.

A large difference between rhythmic gymnastics and the other codes is that the rhythmic floor allows multiple people and apparatus to train on it at the one time. The mobile nature of the rhythmic apparatus means that the apparatus can be carried onto the floor and each gymnast can work with their

own apparatus rather than waiting for a turn as in artistic gymnastics. The usual rule of work is for all gymnasts in a group of around 4 - 12 to be training at once on the rhythmic floor, but for only one of these gymnasts to be performing with the music running. The gymnast with the music running is given 'right of way' with the other gymnasts moving out of her way as she moves throughout the floor. This different assemblage means that while in artistic gymnastics gymnasts will almost only perform routines right before a competition, in rhythmic gymnastics there is always time to wait between routines where the gymnasts practise individual skills around those practicing routines.

Conclusion

Through following the gymnastics training network, a number of strands in the network are revealed. Firstly, the creation of the routine includes assembling the body and the competition equipment together in line with the requirements of the Code of Points. Part of the role of the coach is to translate and interpret the Code into an effective gymnastics routine, though often the coach may enrol a specialist choreographer to assist with this process. Yet the network can also be followed backwards, with the coaches' interpretation of the Code influencing what the Code will say after being updated. Following this chain of translation confirms Latour's (1991, 1995, 1999, 2005) assertion that through following the actants, the connections between the micro and macro are revealed without any need to identify a strict separation between the two. In this case, the chain reveals how the supposedly micro workings of gymnastics training are influenced by the supposedly macro world-wide organisation called the FIG through the Code, and how the FIG are also influenced by what occurs in gymnastics training. The chain can be followed in both directions, from the highest level of authority, the FIG, through the Code of Points to the five year old beginner gymnast whose training programme has been created with the goal of one day competing on the international stage.

The way the FIG can be affected by supposedly micro practices was also apparent through examining the Code in relation to the timing requirements. Examining these reveals how the physical properties of the equipment have a strong influence on the rules. Timing restrictions only exist on those apparatus which involve standing up, where it is easy for the body to keep performing for a long period of times. On those apparatus where the body finds it very tiring to perform on the apparatus, such as the rings, there is no need for a time restriction.

The significance of the non-human actants was also apparent within training. Every gymnasium was found to include a large number of non-human actants used to mediate the training process. As described in this chapter, they included items that substituted for the coaches' bodies, where the coach literally delegated the job of assisting the gymnast to the non-human. They also included mediators that mediated the apparatus and the gymnast assemblage working together more effectively, items that

ensured the safety of the gymnast, and items that contributed to strategies to counter anti-programmes affecting the gymnasts' performance.

Finally, this chapter demonstrated how through following the actants reveals the power relations within the sport. In gymnastics training, as the coach is the one with the most knowledge of how to translate the Code of Points into an effective training programme, the coach therefore appears to hold the majority of the power. However, the coach has to create routines within the bounds of the Code of Points, meaning the training programme is somewhat directed by the FIG. Also, following the actants revealed how gymnasts and parents create their own gymnast assemblages which only include the coach/es that they wish to work with, demonstrating that the gymnast and parents also have power to enrol or un-enrol themselves from a gymnastics programme. Following the actants in this way does not privilege an interpretation of, for example, docility, but instead shows how the gymnastics assemblage is constantly shifting and vulnerable to various anti-programmes. The complexities of these power arrangements are further explored in the following chapter, which moves to examine the introduction of the specific non-human actant of video technology into the training environment.

Chapter 5

To Video or Not to Video? That is Not the Question

Sport and science share the same ideal: to continually transcend the limits of the human being...In these conditions, it could be construed that the introduction of technological innovations into elite sport would occur without a problem. However, this is far from the truth. (Trabal, 2008, p. 313)

The ability for technology and equipment to influence sporting practice is agreed upon by many researchers (see for example, Brewer, 2002; Butryn, 2002, 2003; Hardman, 2002; Rosen, 1993; Shogan, 2002; Subic, 2000; Varney, 2002). Elite athletes, coaches and scientists are continually searching for new and legal methods to improve performance and the introducing of new technologies is believed to be a common way to achieve improvement. Shogan (1999) notes how the quest for success led to sport being Taylorised (see Brohm, 1978) and the introduction of technologies becoming crucial to the production of high performance sport, particularly in the late 20th century. This chapter focuses on the introduction of non-gymnastics technologies into the gymnastics training environment in New Zealand, a phenomenon which has become increasingly common over the last four years. The most commonly used technologies are video based, with several video systems being integrated into everyday training programmes.

Trabal (2008) examined the introduction of new technological innovations in kayaking, and highlights how there are a range of key actors, including the “Federation”, athletes and coaches, whose attitudes can influence whether the new idea will be used in the sport. He suggests that to examine new technological innovations, sociologists should move away from theoretical approaches that either “demand prior operations of qualification” (Trabal, 2008, p. 328) or that rely on assuming resistance to innovation. He argues that models that demand prior qualification do not acknowledge the possibilities for change and evolution. For example, he critiques an earlier study by Lapierre (1981) who assumes a model of social class directly influencing attitudes to technology, when Trabal’s (2008) own research reveals no correlation between these two factors. In using the term “resistance” Trabal (2008) argues that this involves the creation of a binary where some are ‘for’ and some ‘against’ the new technology. Trabal (2008) suggests that framing attitudes to technology in this way misses the complexity of how and why it is used.

In line with Trabal's (2008) argument, this chapter avoids classifying the actors and instead examines who or what acts (Latour, 2005) when following the introduction of video technologies into the gymnastics training environment. Chapter six examines the enrolment of sports scientists and their technologies and chapter seven follows the use of the video camera for judging. While chapter four examined the training process with reference to a variety of non-human actants, this chapter focuses on one specific actant: video technology. This chapter examines the use of video based technologies by coaches and gymnasts as a part of the gymnastics training process. The first part of this chapter follows the use of the camera in the gymnasium and over the internet as part of training in a variety of gymnasiums. The second part of this chapter describes a specific case of one gymnasium which introduced a video replay system into the training environment.

As Butryn (2003) notes, videotape analysis has been identified as one of the primary forms of technology used in sports training and therefore commands attention from a variety of researchers. Several authors have examined how to use videotape analysis as a useful teaching or coaching tool and have developed methods of using videotape analysis effectively (Darden, 1999; Guadagnoli et. al., 2002; Jambor, 1995; Seifreid, 2005). It is agreed by physical educators that any form of video feedback becomes useful when it is athlete or student directed rather than coach or teacher controlled (Darden, 1999; Guadagnoli et. al., 2002; LaMaster, 2002; Seifreid, 2005). This chapter examines both the types of video technologies that are enrolled by coaches and athletes and the way that they are used within gymnasiums.

While there are a number of studies specifically examining the efficacy of video feedback for improving learning (see for example, Baudry, Leroy and Chollet, 2006; Guadagnoli et al., 2002; Horn, Williams and Scott, 2002; Shipley-Benamou, Lutzker and Taubman, 2002), the question of how technologies and equipment are integrated into and used in the competitive training environment is rarely discussed. Scientists and designers of sporting technology often work in laboratories, quite separate from the gymnasiums, courts or fields where sport training generally occurs. Yu and Farin (2005) describe how from the computer scientist's perspective, sport can provide an ideal testing ground for new technical developments owing to the rule specific nature of sporting competition. The sports ground is a contained environment with clear rules, creating an ideal arena for data collection. Nonetheless, data collection almost always occurs under specially set up conditions and not as part of a training programme. One question this chapter attempts to explore is how new technologies are introduced into the sports training ground. As Sands (1999b) points out, this can be problematic:

Coaches are not scientists... When a coach is confronted with new information, he/she must decide if the information applies to a particular athlete, which athletes should use it, which coaches should use it, the importance of growth and development, what alternative explanations are available, and many others. These problems add layers of uncertainty to the implementation of any scientific information. (Sands, 1999b, para. 5)

As Sands describes, there are many variables coaches must consider when planning a programme which must be taken into account when a new idea or innovation is introduced. The new technology may or may not be something that will assist with that particular training programme. Moreover, once introduced, the coaches may then need to be taught how to use the new technology to its maximum effectiveness (Lim, 2005).

Which Type of Video?

In gymnastics, every coach and almost all athletes interviewed described how they had used some form of video feedback in a training session at some point. The video systems took a variety of forms, from hand held video cameras to software systems using a webcam and a laptop.

The hand held camera was used with great enthusiasm in several gymnasiums. The most common method of usage was for the coach, a parent or another gymnast to hold the camera and video the relevant gymnast, usually for only a few seconds or up to around two minutes at one time. The coach would then usually rewind the video and show the gymnast who had just performed their attempt on the small video screen. Jessica, a women's gymnastics coach, described how in some cases the gymnasts would request to be videoed while at other times she would decide that it would be useful:

Normally the girls would say to me "can you video this?" and I know that when they say that to me, they want that feedback so I'm quite happy to spend the time rewinding etc. Especially for the older girls... my girls would probably have the video out about twice a week. (Jessica)

In Jessica's gymnasium, teenage gymnasts would simply request the use of the video camera, go into the office where it was kept to find the camera and bring it back into the gymnasium. Either Jessica or another gymnast would usually video the gymnast who wanted the feedback. In another gymnasium, the coach would simply enrol a parent to bring his video camera with

him to a session and video the gymnasts. The parent was extremely happy to stand and video each gymnast as the coach requested. In a different gymnasium, every gymnast was required to own their own video camera and tripod, which they were instructed by their coaches to set up at the front of the training room and switch on to video the entire training practice.

However, not all coaches agreed with the hand held camera being a useful device. Several coaches argued against the use of the traditional video camera owing to its time consuming nature, as both Amy and Mike described:

It's good, it's great, but it's just time consuming. You have to get the video out and set up the tripod and get it in the right place, oh drama! (Amy, trampoline coach)

I don't like it because of the time... Time to set up, time to, well, if I'm looking through a camera then I can't see the whole thing properly and then you've got to replay it.

While I'm trying to point out to the gymnast, then I'm missing everything else that's going on. (Mike, men's gymnastics coach)

While Amy and Mike both commented on the set up time and how that takes time away from coaching, others argued that it was the analysis of the video that was most time consuming. The analysis typically involves carefully watching the video, often in slow motion or pausing important points. Liebermann et al. (2002) noted that one drawback with using video feedback systems in coaching is the time involved in analysing the video biomechanically: "the time taken to record manually and accurately the coordinates of the joints of the body and other points important in the analysis" (Liebermann et al., 2002, p. 756). Here, they refer to the need for measuring the exact angles of the body to work out whether it is positioned correctly. Liam, a women's gymnastics coach, agreed with Liebermann et al. (2002) about the time consuming nature of video analysis:

I have used video analysis. I have problems with that though, that I need instant feedback. I have used Silicon Coach... but with the system they've got in New Zealand I don't have the time to sit down with a particular athlete because I am club paid and not a paid national coach where I can sit down with each individual and work out my time. So, I need to keep up numbers in my group. It's easiest for me to just watch one once, then on to the next group. They're expecting the group to be viable. (Liam)

Liam argued that because he needs to coach a reasonable sized group of gymnasts in order for his programme to remain financially viable, he does not have time for any video analysis that

requires extra time. Mike, a men's gymnastics coach, commented on the same issue, saying that finding time for video analysis is difficult "where you've got 8 or so gymnasts. It might be different if you'd only got 4 or 6." Mike and Liam both argue that because their gymnasiums do not include government funding as part of their assemblage, they need to coach more gymnasts than is considered ideal for elite training and therefore the video camera is too time consuming for them to enrol.

Wajcman (2008) notes how technologies such as video have the ability to reconfigure time by improving efficiency. However, Amy, Mike and Liam all argue that the hand held video camera instead decreases efficiency, that they have limited time in the gymnasium and that their priority is to spend all of this time training. In line with this, sports scientist Robert argued, in his interview, that the most important feature a piece of technology could have would be for it to not interfere with normal training.

In the quote above, Liam also referred to the most popular sports science software in New Zealand: Silicon Coach. As Darren, a sports scientist, described, Silicon Coach has a variety of applications and has become highly popular for a range of sports in New Zealand:

In NZ, the major skill analysis programme is a thing called Silicon Coach, which is home grown, came out of Dunedin, still in Dunedin. It has world wide distribution now, mainly because it's very easy to use, not too complex and aimed at the basic level coach... It allows you to video your athlete, put the video in your computer, stop it, progress it frame by frame, draw on it, compare it by putting two frames side by side, compare your athlete this month with your athlete last month. Or your athlete now with an expert. It allows you to put several things on the screen at once... You can now email it to the other side of the world. We have a hammer thrower in Wellington whose coach is in Auckland and he just sets up his camera, films himself, and goes home, sits at his computer, sends it to his coach, who analyses it and sends it back. (Darren)

Although Darren described the daily use of Silicon Coach in other sports, in gymnastics Silicon Coach was rarely used by coaches or athletes. Mike and Liam argued that this is because gymnastics coaches do not have the time to perform the analyses. Natalie, an aerobics coach, described how the most useful feature of Silicon Coach for her could more easily be obtained using a different method:

...we could use Silicon Coach to break skills down but it's just as easy to get the right video and turn it side on and video it again and get them to look at it because they can

see exactly the same things rather than setting up the two video cameras for Silicon Coach. (Natalie)

Natalie described how the feature she is most interested in from Silicon Coach includes two video cameras as part of its assemblage which she finds too time consuming to set up. She describes how instead she has developed a perfectly acceptable method to substitute for Silicon Coach entailing turning a standard video camera side on.

Robert, who holds a number of roles in gymnastics and in computing and sports science, described other features of Silicon Coach but agreed with Liam that the programme was in general too time consuming to be useful for coaches and gymnasts:

(Silicon Coach) is primarily sold as an aid to determine biomechanical characteristics such as joint angles of athletes. But that needs people after they've videoed it to frame by frame on the computer and manually draw lines through the trunk and the head and so on and feet and hands of the body. And once they've manually drawn the lines then the programme automatically calculates the angles between the lines they've manually drawn. This is a very time consuming process, so unless you have been commissioned as sports scientist to specifically analyse someone's performance or you're a coach with the determination and discipline to put a lot of time in every day, it's unlikely it would be engaged in regular usage in a routine coaching situation. (Robert)

Robert's experience with software based technologies was that they "gathered dust" in many sports clubs in New Zealand and this led him to create his own video feedback system that was cheap, easy to use and did not demand any time from either the coaches or the gymnasts. It consisted of a webcam plugged into any form of computer, where the computer could display what the webcam 'saw' from a few seconds to several minutes ago. This allowed athletes to perform movements and immediately watch themselves on the screen without having to rewind a tape and finding the right place on the tape. Unlike other video systems, it was designed to be able to be left on at all times and used as much or as little as the coach or athlete chose. It was deliberately designed to not be a product that required extra time that would normally be used for direct sporting practice. Guadagnoli et. al. (2002) described how in their golfing study, players who used video feedback practised hitting only a third of the number of balls compared to those players who did not use it. This created a feeling that although it may have other benefits, the video feedback takes time away from practice. Amy, a trampoline coach, described her preference for Robert's system over hand held cameras

because she could leave it running and the athletes would use it themselves. It did not take time away from training in the way that Guadagnoli et. al. (2002) suggests can happen:

It helps me as a coach because what I like to do is only coach while they're on the tramp doing their moves. I don't like to sit down and analyse too much because then I can't run all the other kids through. I know it's not wasted time but it is down time that I could do better with. So I can coach while they're on the tramp then I can say go and look at it and see if you can see the difference in each move. So I love that. It's great...And not having to push any buttons to do it. We have video sessions but then we have to watch it afterwards and rewind and find the right place. This is just for them.
(Amy)

Meg agreed with Amy that Robert's system was preferable to a hand held video camera:

This is kind of an immediate thing. They can do one routine or one skill and see it straight away. Whereas with the video, the small screen, you can't see yourself or oh, that was a bad video job by me... it's time consuming. And that's fine if you had two kids. (Meg)

For Meg, it was the immediacy of Robert's system that was valuable. It not only revealed the performance of the athlete in possible slow motion, it was able to do so immediately after the gymnast attempted the skill, when all thoughts about the skill are still fresh in their minds. Four gymnasiums around New Zealand adopted Robert's system enthusiastically. The second part of this chapter describes the introduction of this system into one gymnasium over a six week period.

In describing the types of video systems that coaches preferred, coaches often referred to the lack of time and money to allow them to spend time analysing video. Coaches argued that if New Zealand had a gymnastics network that made it possible for coaches to work with only a small number of gymnasts, such as an elite gymnastics system that was fully government funded like the East German model, then they would have more time for video analysis. The choice of the coaches to enrol or not enrol the video appears to be based less on what the video camera can or cannot do and rather on how the gymnastics network in New Zealand relies on clubs to generate their own funding for high performance programmes.

Why Use Video?

Coaches at all levels of sport regularly use videotaped performances and practices to assess, demonstrate to, and motivate their athletes (Seifried, 2005). Video is agreed to have strong potential for improving learning through observational learning, where students or athletes video themselves or experts and watch it in order to improve their own performance (Anderson, Mikat and Matinez, 2001; Baudry, Leroy and Chollet, 2006; Hayes et. al., 2007; Horn, Williams and Scott, 2002; Shipley-Benamou, Lutzker and Taubman, 2002). In specifically examining the use of video feedback in men's artistic gymnastics, Baudry, Leroy and Chollet (2006) describe how traditionally in gymnastics, video has only been utilised for analysing kinetic variables rather than for increasing learning. For example, in examining the effectiveness of video feedback in learning a basic pommel horse skill, Baudry, Leroy and Chollet (2006) found a greater level of skill improvement by those gymnasts who were given video feedback enabling them to directly watch their kinetic movements. Shipley-Benamou, Lutzker and Taubman (2002) also found greater skill improvement through video feedback in their study of children with autism, as did the golfers in Guadagnoli, Holcomb and Davis' (2002) study and the soccer players in the study by Horn, Williams and Scott (2002). However others had reservations about the use of video feedback. Several authors (Darden, 1999; Guadagnoli et al., 2002; Jambor, 1995; Seifried, 2005) described how video feedback in itself is not necessarily a useful tool, with results varying depending on the way that it is used. Most agreed that any form of video feedback becomes more useful when it is athlete or student directed rather than coach or teacher controlled (Darden, 1999; Guadagnoli et. al., 2002; LaMaster, 2002; Seifreid, 2005).

In gymnastics in New Zealand, video systems were used in a variety of ways and for a range of purposes. While the majority of research studies were specifically examining the effect of video on the learning process, this chapter is more interested in how video was used within the 'normal' training environment. The studies described above mostly involved testing video in a specially set up 'classroom' type environment, rather than observing already existing training sessions.

The simplest and most common use of video was to show gymnasts that they were or were not doing something correctly, as several coaches described. It is a way of revealing the exact appearance of the body in motion to that performer. Jessica, a women's gymnastics coach, described how it was useful for very young and inexperienced gymnasts for "just showing them bent knees and unpointed toes". This confirms Guadagnoli, Holcomb and Davis' (2002) suggestion that novice athletes lack the necessary knowledge to understand their mistakes and

make corrections, and that video can be a useful tool for teaching these athletes about desirable outcomes.

Karen and Mary, rhythmic coaches, and Natalie, an aerobics coach, all described how video showed the gymnasts something they were doing wrong which they apparently could not feel themselves. In these situations, the athletes already had the knowledge to know what they should look like but lacked the ability to feel if they are doing things correctly:

You're telling them to do something which they obviously can't feel. Whereas the video will show it to them and they go "oh my gosh!" when they suddenly see their feet. Mine correct it straight away. (Karen)

Well it's like you telling them to straighten their knees every day, so after a while they don't listen. Now yesterday it was good, they hadn't done this (video) for a while and in their ring balance, they immediately saw their knees. I've been working so hard on that lately. It's definitely useful. (Mary)

We video parts of routines and show them what they're doing. Because we say "you're doing this" and they say "no I'm not"! Feedback for the athletes so they can see what they're doing and see what they look like. So when you say your arm movements aren't precise, have a look! No, your feet were not pointed. Being able to see what they're doing makes a big difference. I don't think gymnastics uses video anywhere near enough. (Natalie)

Jambor and Weekes (1995, p. 48) described the method of the teacher or coach pointing out errors on the video to the students or athletes as the most 'traditional' usage of video, a method they argued to be highly effective for some athletes, but not all. In many gymnasiums coaches were observed to be pointing out errors in exactly the way that Jambor and Weekes (1995) described, however, there were also many cases of athletes having sufficient knowledge to self-correct upon seeing themselves on video. For example, Malcolm, a male artistic gymnast, described how he used the video to improve his technique on high bar without any suggestion from his coach:

You get to see what you're doing; you get to see what you're doing wrong. If you're putting your head out you can't really tell because you're concentrating on your tap, and when you let go and everything, so you see your head out and go "wow, better put that back in!" (Malcolm)

The word “tap” refers to a particular movement that gymnasts make in order to make the bar propel them correctly. Malcolm described how the video allowed him to see what he was doing and essentially self-coach himself.

Kay, a trampolinist, agreed with Malcolm, although for Kay, the video showed her that she was performing better than she expected rather than showing her mistakes:

So it's quite useful because if he (the coach) tells us something then we can go look at it and see for ourselves. I really enjoy doing that because it's really helpful...Just seeing it for yourself and seeing if you are in fact low or high or you know. If he (the coach) tells you you've had plenty of time to land the skill and you don't think you did, you know, third opinion kind of thing. Often proved wrong. (Kay)

Karen, a rhythmic coach, also described a related but slightly different reason for using video. Karen referred to the way that coaches can physically manipulate the leg to put it in the correct position during many movements. However, she described how when the gymnast is practicing leaping “you can't actually touch their leg while they're leaping” therefore the video allows the coach to show the gymnasts whether their leg is in the correct position. The work of coaching is essentially delegated from the coach to the video camera.

Natalie, an aerobics coach, described how video could be useful as a memory tool. She described how the choreography in aerobics can be very complex and difficult to remember and as a result, Natalie had started using video as a reference tool for athletes to use to remember their choreography:

...new choreography is videoed and given to the athletes so they don't forget it. All their routines were done before Christmas and guess what would happen?! For instance, this year I brought over a choreographer from Australia for my international kids and what he did was tape them all the leg patterns and all the arms... I put in on DVD for them, yes, and keep the master! (Natalie)

Harriett, an aerobics competitor, described how she found having a DVD of her choreography very useful:

When we were learning our new routines we got a guy to choreograph them from Australia and (our coach) videoed them as we were learning so we could look back...if we forgot a part then we could just watch it. (Harriett)

Barbie, a rhythmic gymnastics group member, described yet another use of the video. For her, the video was useful in order to ensure that her own movements matched the other gymnasts in the group:

Barbie: ...the timing and stuff. And usually I go really fast. So it's like, oops, the others haven't finished yet.

Roslyn: I guess in group you can't see what everyone else is doing?

Barbie: No. Especially when you're in the front. Sometimes you concentrate so much you forget to watch the other people.

Barbie utilises the 'mirror' function that the video provides to see how she fits in with the other gymnasts. In rhythmic group routines, perfect synchronisation is essential, so it was imperative for Barbie to be able to see when she was out of time. While mirrors allowed Barbie to see this if she happened to be facing forward, a lot of the routine involved her performing complex movements which made it impossible to look in the mirror during the routine. The video provided a way for her to examine her synchronicity when she could stand still and watch all the details of the routine.

Mary, a rhythmic coach, and Esmerelda, a trampolinist, described the use of video for developing visualisation skills. Mary described how in her opinion visualisation skills are of prime importance because she has found a high correlation between what gymnasts can visualise themselves doing and how they perform at a competition:

I just lie them down on the floor, relax them and tell them to go through their routines. The next question I ask is: did you do it perfectly? And this is really interesting because they're usually quite honest and they'll say, no I dropped the ball here, or I did this or that or the other thing. That tells me a lot about their mental stability. And the others say they finish late. Some of the things that come out show you you've got a lot more work to do! And some of them say yes, most of the kids that say that are the ones you know are going to do well in the next competition. (Mary)

In order to develop the skills to visualise, Mary described how the gymnasts first watch themselves on a video and get used to seeing themselves, and then over time they are able to both see and feel themselves performing, which leads to greater success. Esmerelda described how as an athlete, she was taken by surprise by how her visualisation skills improved as a result of using video feedback on a daily basis. She described how video feedback solved her lack of ability to visualise. At the time of her interview, a video feedback system had been put into her gym a year earlier:

(A year ago at a camp)...this lady was like, visualise a circle, then a square and I was just like “all I see is pigs flying with bazookas, I can’t do this!”... And she was like, I really think you need some visualisation sheets and so I went home and worked on them. And I could finally see a square, which was all I could see... but as soon as I get on the tramp, I walk up to the tramp, get on the tramp, start bouncing, it just all falls apart. And she was like “well, do you watch any videos of yourself?” And I thought about it and realised, not really, I hadn’t really had that access...but just a couple of months ago we were lying down and were like, let’s try and visualise our routines now, and I could do my full routine and I couldn’t work it out for ages, why suddenly I could do it, routine after routine. But then I was talking with mum or someone about it, and they pointed out that I’m watching myself a lot more and I know what it looks like.
(Esmerelda)

In Esmerelda’s case, a new video replay system had been placed in the gym several months prior to the interview which allowed her to watch herself during every training session. In training, I observed Esmerelda consulting the video replay system after every turn on the trampoline.

Another way that video has become commonly used in gymnastics training is simply for coaches and gymnasts to watch videos of the top gymnasts in the world for ideas and inspiration. A number of studies have confirmed that watching videos of experts is a very effective type of observational learning (Baudry, Leroy and Chollet, 2006; Hayes et. al., 2007; Horn, Williams and Scott, 2002; Shipley-Benamou, Lutzker and Taubman, 2002). Mike, a men’s gymnastics coach, described how he found watching these videos more useful than videoing his own athletes as he could learn from the way the top athletes performed their skills:

I used to watch gym videos... because I know what my athletes are doing, so to look at a move, how it’s done or if I might want to change how my athletes are doing it. If

someone wants to change, then I might want to look at how other athletes are doing it.
(Mike)

Throughout 2006 and 2007 the use of videos of top athletes for inspiration became increasingly common with the popularity of www.youtube.com. Coaches and gymnasts began to realise that most of the top routines in the world could be found on www.youtube.com or similar websites. Ken, a trampolinist, described how he used YouTube to watch some of the most difficult trampolining routines in the world which were performed in non-competitive settings on non-competitive trampolines, which he would normally never be able to see without physically visiting the gymnasium at the exact time of the routine being performed.

However, not only did YouTube allow access to videos for use as Mike and Ken described, it also allowed the overseas performances of New Zealand gymnasts to become visible. An excellent example of how the visibility of these performances can impact an athlete's future trajectory occurred in 2007. A group of gymnasts competing overseas were disappointed with their performance and readily admitted to making mistakes while away. Upon returning to NZ, various theories were given for their lack of performance, including citing the inexperience of one member of the team. However, their routines from the overseas competition appeared on YouTube, allowing coaches and gymnasts around the country to watch them and it was revealed that it was in fact a more experienced member of the team who had performed below expectation. This had further implications for this experienced gymnast, as several coaches and judges around the country developed negative opinions about her as a result of watching her sub-par performance on YouTube. The ability for YouTube to reveal occurrences that would previously be kept hidden is particularly noted by Gueorguieva (2007) who examined the effect of YouTube in election campaigns in the USA. She cited the case of Senator George Allen, who like the gymnast described above, lost credibility due to the existence of a YouTube video which showed him behaving inappropriately. The global circulation of videos through YouTube allows the revealing of previously unseen performances and opens up the issue of copying and comparing performances across time and space.

Observations and interviews revealed the video camera to be used in a variety of ways including for coach correction, self-correction by athletes, as a memory tool, visualisation tool and for making overseas performances visible in New Zealand. Coaches revealed the concern that video and video related software, although useful, are too time consuming and take time away from training. The next section of this chapter follows the introduction of a type of

video software designed by Robert, a sports scientist and ex-gymnast, to solve this problem, into a high performance gymnasium over a six week period.

Following the Introduction of the Computer Replay System into One Gymnasium over Six Weeks

In May 2005, after discussion and agreement with the coaches and administrators of the club, Robert placed two computer replay systems in a gymnasium which catered for several gymnastics codes, including rhythmic gymnastics and trampolining. Robert believed that creating a permanently set up video system, which also included some other computerised features, would assist athletes in improving their performances.

He placed one system in the trampolining area and one on the corner of the rhythmic gymnastics floor. The system was made up of a web camera and a computer, with the computer monitor displaying a delayed replay of what the web camera recorded. Robert explained:

A web camera is plugged into a computer and the images the camera sees at 30 frames per second are temporarily stored in memory and then shown on the computer monitor anywhere from a few seconds to a few minutes later. And that time delay can be varied by the coach or athlete during a training session. So the system can run continuously because there's no concern about filling up a hard disk. Because it can run continuously the athletes or coaches can choose to ignore it or use it whenever they want to so it becomes irrelevant to them whether it's going or not. So it can be permanently going 24/7 if they want it to, without interfering with the traditional training that both the athlete and coach are used to, which to me was an important aspect to it. (Robert)

As described earlier in this chapter, generally when coaches use video during training, it involves videoing the gymnasts then watching their performance at a later time. This means that the only way to make time to watch the video is to take time away from training or other activities. By contrast, Robert's system is designed to "play the video" of the gymnast a set time after the gymnast has completed that skill. For example, the gymnast may set the computer to have a two minute delay. This means the monitor will show what the camera 'saw' two minutes ago. So the gymnast can do a routine that lasts two minutes, then immediately watch the two minute routine on the computer screen. The delay can be varied from "a few seconds to a few minutes". Also, Robert described "if it's a minute delay, they can press the space bar to freeze the last minute and go frame by frame through the last

minute if they want to". If the gymnast wishes to see one part of her routine in more detail, she needs to press the space bar while watching her routine to freeze it, and then she can move the video forward and backwards to see herself in slow motion.

Robert's system facilitated the dual function of increasing efficiency and slowing down time. Allowing the video to be frozen or seen in slow motion meant that time is in essence slowed down. However, in revealing the body's movements in this level of detail, the gymnast is able to learn about their performance far more efficiently. The gymnast's performance is instantly revealed, but able to be viewed at any speed.

Another advantage of Robert's system is that it allows what Darden (1999) describes as the most effective way to use video feedback. Darden (1999, p. 45) states:

Instructors should show only one or two specific elements followed immediately by practice and repeat this process until instructional goals are met. It is unfair to expect students to remember or reproduce elements from long, continuous segments of (video feedback).

Robert's system could be used in this manner: the athlete could continuously perform movements followed by watching themselves on the video without having to interrupt their training with rewinding or waiting for the right place on the tape. Robert emphasised that it was important to him that the technology did not interfere with traditional training. He described many systems which are time consuming to set up and to use as the norm for using video feedback in sport. His system overcame this limitation due to its simple design and emphasis on user friendliness. There were only five keys to use: page up and down to vary the time delay, space bar to pause, and < > to move frame by frame. Sands (1999) confirmed that technology appears to be more effectively used by coaches when it is simple to use.

Robert described how he spent a lot of time choosing where the computers should be placed in the gymnasium. He watched training sessions and considered both where the camera should be placed for most effectiveness, and where the monitor should be placed for maximum usage. He described how for trampolining, he changed the monitor placement several times in order to find the place where the athletes and coach congregated most often and placed the device there. Robert described how for rhythmic gymnastics he placed the camera in the place which gave the largest view of the mat:

I located the camera in a position with the optimal full view angle so that the athletes were as big as possible on the monitor. Because unlike trampolining they are moving very close to very far away and when they are far away they look so small. So it was important to position it in such a way as the angle could be as small as possible. So I put it in the corner of the floor at a 90 degree angle with the camera because the floor is square. And the monitor I positioned near where the coaches sit anyway. (Robert)

Robert described how he took into account the different assemblages in each code and thought carefully about what would need to be shown in each code. He described how he installed the system, trained the coaches on how to use it, and left them to their training, although he did observe sessions afterwards and asked coaches and athletes for feedback in the following weeks.

Woolgar (1996) argues how the way software is constructed configures the users to conform to the software designer's expectations. He argues that software programmes have limited functions for the users, which means if the user behaves differently to the designer's expectations, the software will not perform for the user (Woolgar 1996, p. 241). This follows that all software systems are created to fulfil a particular function, which the designer believes is required for the users. In this particular environment, Robert spent time in the gymnasium to try to understand the needs of the coaches and athletes, and created the programme to fulfil what he perceived to be an important need. He believed that it would be beneficial and useful for coaches in this gymnasium to be using video analysis.

Before understanding how the replay system affected training, it is necessary to describe how training took place in this gymnasium in trampolining and rhythmic gymnastics.

Trampolining Training Before the Video Replay System



Fig. 5.1 The Trampolining Set up of the Gymnasium. Photo taken and owned by researcher.

As can be seen in the above photo, the trampolining area of the gymnasium included four obvious actants: four trampolines all placed together. Three trampolines were the official type of trampoline used at World Championships and Olympic competitions, generally called “Euros” by the trampolinists³⁵, while the fourth trampoline looked more like a backyard trampoline. The “Euros” are larger, more bouncy and have large mats attached to the end of them for safety, in comparison to the fourth “yellow tramp”. This photo also shows other actants in trampolining, the blue and green mats that lie on the floor next to the trampolines.

In a typical training session, the trampolinists performed stretching and strengthening exercises³⁶ on the floor area beside the trampolines³⁷ for about 20 minutes. They then began bouncing on the trampolines, first practising simple moves like jumping up and down keeping their bodies straight, then moving to more complex somersaults with multiple twists and turns. They spent some time on one or two skills, and some time doing their whole ten skill routine. There were between 6- 8 girls in the group, aged between 14 and 21. At all times, only three or four trampolinists were practising on the trampolines, as it was only possible to have one person on each trampoline at a time. Generally, this group did not use the yellow

³⁵ This is short for “Eurotramp”, the company which has the patent on this particular type of trampoline and currently has a monopoly on many of the high level trampolining competitions.

³⁶ These consist of stretches for the hamstrings, shoulders, splits, quadriceps, back and stomach. Strengthening exercises are generally sit-up type exercises for the abdominal muscles, and push up type exercises to build arm muscles.

³⁷ The “floor area” is the official artistic gymnastics floor which is shared with artistic gymnasts at this time.

trampoline, preferring to train on the official trampolines they need to compete on in competitions. This meant that at all times, there were three or four trampolinists doing something other than bouncing on the trampoline. When not on the trampolines, the girls tended to go to the toilet, talk to each other, do their hair, change clothes, write in their training notebooks or, ‘throw in’ one of the blue or green mats. The mat was ‘thrown in’ by one of the trampolinists for another when practising moves they did not appear completely comfortable with. It was ‘thrown in’ during the difficult moves so that the trampolinist performing the move landed on the mat, not on the trampoline, slowing their bounce and ensuring they land safely³⁸. At all times, the coach stood on the floor area, a little bit back from the trampolines and watched the two trampolines closest to him.

In each session, trampolinists tended to remain on one trampoline for their turn for about five minutes. They then got off the trampoline, did something else, and returned for another turn usually about ten minutes later. In interviews, the trampolinists revealed that they generally need to use the toilet every 10 minutes because bouncing puts pressure on the bladder, so it is quite normal for a trampolinist to leave the trampolining area and use the toilet after almost every turn on the trampoline.

Rhythmic Gymnastics Training Before the Video Replay System



Fig. 5.2 The rhythmic training floor. Photo owned and taken by researcher.

The above photograph shows the rhythmic gymnastics training floor. The largest actant is a beige carpet made of seven thin mats velcroed together 14m x 14m in size, though there is

³⁸ If the trampolinist is performing a particularly hard or new move, a larger and fatter blue mat is thrown in, however if they are performing something they feel fairly comfortable with, the smaller and thinner green mat is thrown in.

also a stereo, and bars against the wall. The rhythmic gymnasts also worked in a “ballet room” a smaller room next to the rhythmic floor with a much lower ceiling, which also includes a small storeroom where the girls keep their apparatus and bags. In contrast to trampolining where there is only one ‘apparatus’ actant involved, the trampoline, in rhythmic there are several apparatus owned by the gymnasts.

As in trampolining, there were about 6 – 8 girls in the high performance group. They were a little younger than the trampolinists, aged between 11 and 16. In a typical training session, the girls arrived, placed their bags and apparatus in the store room and then spent one hour on warm up exercises in the ballet room. For the first part of their warm up, the rope was a dominant actant for skipping which was practiced to warm up the gymnast. For their extensive stretching³⁹, which came next, another actant was introduced: the chair. In order to improve their splits, the rhythmic gymnasts placed one foot on the chair while sitting on the floor in splits. After stretching, they moved to the rhythmic floor and spent half an hour or an hour practising specific skills. They would line up on the edge of the rhythmic floor and perform rows of specific balances, turns and leaps or walkovers with the coach standing watching and correcting everything they did. Or they would use their apparatus to practise throws on the mat while the coach watched. Then they spent the remaining two hours or so practising routines.

In contrast to trampolining, in rhythmic there was often more than one person working with the girls. There were always one or two coaches present, and often a third person, a judge, who although she did not direct the girls, continually pointed out corrections and clarified things with the coaches⁴⁰. Routines were done with one girl performing a routine to music on the floor with her apparatus, while the others practised parts of their routines around her on the floor, moving out of her way if she came near them. They each took turns to do one routine, and then returned to practising parts.

Unlike the trampoline, the rhythmic floor is able to have many people on it at once and all the girls are constantly on the floor and all practising rhythmic gymnastics at all times. Both sports are assembled through actants throwing other actants in the air; however there are huge differences in mobility between the actants assembled for each sport which influence how

³⁹ The rhythmic gymnasts spend a great deal of time practising the splits and bridges. They practise splits with one foot placed up on a chair and hold for several minutes, plus many types of exercises to increase their back flexibility.

⁴⁰ In an interview, it was explained that rhythmic coaches must submit a detailed judging sheet describing exactly what their gymnasts will be performing in their routines prior to competing. These mean the coach needs a substantial amount of help from judges to plan routines and complete these sheets.

training occurs. The rhythmic mat is completely immobile regardless of how many gymnasts are training on it. By contrast, the trampoline mat, although attached to an immobile frame, is mobile. When another actant stands on the mat, it moves in response. As a result, trampolining requires that only one actant use the trampoline mat at a time to create effective trampolining, while the rhythmic mat is not affected if many actants use the mat at once.

Trampolining with the Video Replay System

In trampolining, during the first week with the introduced system, the new system was of great interest to the trampolinists. So much so that the coach felt they were spending too much time looking at the computer and not enough time training on the trampolines, prompting the coach to warn “if you girls don’t get back to work, I’m going to turn that machine off forever!” The trampolinists watched themselves on the screen as soon as their turn on the trampoline was finished, and only then going to the toilet or throwing the mat in as they did previously. They rushed with great interest to the screen to see themselves; however what they saw was not always what they expected to see. One of the older trampolinists remarked after her turn “I can’t wait to see that move on the computer, it was perfect!” However, upon watching herself on the computer, she discovered that she was very far from perfect and expressed great disappointment with herself and surprise that it ‘felt’ perfect to her in the air yet was clearly not so to the eye.

During the next six weeks, the computer system became a ‘normal’ part of training for the trampolinists, though not all athletes used it identically. The older trampolinists, who were all also trained as coaches, used it to coach themselves. They would get off the trampoline after their turn and watch themselves without first speaking to the coach for feedback, often slowing the video down or stopping the video at certain points. They would also sometimes discuss what they saw with another trampolinist or the coach, discussing ideas on how to fix what they could see was wrong on the monitor. One of the younger trampolinists, not at all trained in coaching, would not only watch herself. She would watch one of the better trampolinists and compare how they looked with her. She would move the recording forward and backward, flicking between the other trampolinist and herself.

The manager of the trampolining programme described how the new system was allowing the athletes to self-coach themselves:

The girls are taking more interest in self evaluation. They’re more likely now to look at their skills from a judging perspective and compare them to other people’s skills. Now

they're able to make comparisons. They can compare them to their own perceptions of what others do and what their perceptions of their skills are. They can make adjustments based on what they know to be correct. (Susannah)

The coach, although at first showing some uncertainty about the new system, became gradually more used to it as the weeks went by and began referring the trampolinists to it more often.

When this new actant was introduced, a shift in trust occurred between the trampolinists and the coach. Featherstone (2004, p. 11) describes how the automated car has caused a shift from trusting the human drivers to trusting the technology within the car:

... a shift in the mode of trust from trusting other drivers... to trust in the experts who designed the software systems which automatically pilot the car.'

In trampolining, a similar shift occurred. Where previously, the athletes' trust had been 100% in the coach, it was now divided so that the trampolinists trusted what the computer showed as much, or even more, than they did the coach. As Latour describes in his discussions on door hinges and cat flaps, a substitution here has occurred with the new system substituting for 'the eyes' of the coach (Latour 1988, 1995). Where the trampolinists previously had to rely on the coach's eyes and ability to communicate to find out what they looked like, the computer system now replaced the coach.

The trampolining programme manager also noted that the older trampolinists were the ones who use the system the most because they had more knowledge about coaching and how to coach themselves:

...the knowledge and experience to know how to use it better... the fact that all the trampolinists are at least level one⁴¹ coaches does give them an ability to self coach. (Susannah)

Susannah inadvertently points to the shifting of assemblages, as a result of the older athletes' knowledge of coaching. The assemblages of trampolinist and coach were previously reliant

⁴¹ This refers to the coaching qualifications system. Although level one, at the time of this interview, was the lowest level of coaching qualification, the athletes still had to attend a course and pass a test in order to gain this qualification. This manager is simply observing that these athletes had attended and passed the course and therefore had some degree of coaching knowledge.

on each other to produce outcomes. With the computer system, the athletes appeared to believe that the assemblage of trampolinist/computer system/coaching knowledge worked to create high performance trampolining as effectively as the previous assemblage of trampolinist/coach. The athletes found that due to their knowledge and the video system, they were able to self-coach, and found this to be as useful as relying on the coach to correct them.

This is confirmed by the coach's initial comment "if you girls don't get back to work, I'm going to turn that machine off forever!" Although the designer of the technology intended it to "augment" the coaching process, the coach instead immediately recognised that this new system had the ability to substitute for him and was therefore threatened. Robert described this to be an unexpected outcome:

On the trampoline I've noticed that the athletes are using it more than I expected for feedback about their body shape during skills they perform on the trampoline. I expected the coach to be the main user of the technology and reviewing performance with the gymnasts. Whereas very occasionally I see that, but most of the time it appears the gymnasts independently of the coach are watching their performance as soon as they've completed their turn on the trampoline. (Robert)

Further to this unexpected outcome was the trampolinist who used the system to increase her own coaching knowledge. This was unanticipated by the designer. Latour discusses how "the force with which a speaker makes a statement", such as in the case of the designer stating his plans, "is never enough to predict what path that the statement will follow" (Latour, 1991, p. 103). He argues that the path depends on what the listeners, or users, do with the statement. The users in this case were assemblages of youth, comfort with technology and eagerness to learn who eagerly made use of the system. They therefore introduced a new use for the system and changed the trajectory of the computer system as well as that of the trampolinist.

After six weeks, trampolining training had stabilised with the new system accepted as an important actant in the production of trampolining. The shift in trust eventually stabilised so that both the trampolinists and the coach trusted the system and viewed it as an ally. The trampolinists believed the system to be allied to them in showing them faults in their body shapes which the coach may or may not point out. The coach believed the system to be his ally as it was able to prove to the trampolinists that what he was saying about their performance was true. Thus, although initially the new actant disrupted the trampolining network through being perceived as a competitor to the coach, the network soon reassembled

and stabilised with the computer system becoming a standard actant in the creation of trampolining.

Rhythmic Gymnastics with the Video Replay System

In rhythmic gymnastics, Robert's system was used differently to how it was used in trampolining. In contrast to the trampolinists, the rhythmic gymnasts had no 'off time' away from the rhythmic floor in which to watch themselves on the computer. Their training consisted of the gymnasts physically moving and practising at all times. Therefore, the coaches incorporated the computer system in the gym in a different way.

Unlike in trampolining, the rhythmic coaches never viewed the new actant as a rival. Instead, from the beginning, this actant was introduced by the coaches and controlled by them, similar to the stereo system. In rhythmic gymnastics, the new actant never achieved the status it did in trampolining. It was not permitted to be used freely by all actants in the rhythmic environment, but was tightly controlled by the coaches. The coaches did not trust the assemblage of gymnast and system to be a useful one, appearing to perceive the only useful assemblage to be coach and system.

This was possible because there were two coaches present at rhythmic coaching sessions when the computer was used. Sessions worked with one gymnast practising a routine watched by one coach. At the end of the routine, the coach would take the gymnast over to the corner of the mat where the computer was located to watch the routine on the screen together. In the meantime, the other coach would watch the next girl's routine. So at all times, there would be one coach and one gymnast at the computer, while another gymnast practised her routine while being watched by the second coach. In between their turns with the coaches, the gymnasts were almost always on the rhythmic floor practising parts of their routines, often watched by the judge. However, as the weeks since the introduction of the new system went by, the system was used less and less. One of the coaches also took a holiday, and while she was away the system was not turned on.

In interviews, one of the reasons for using the video system in this way was revealed. One of the coaches described how she worried that using video feedback could be negative for the athletes and that because of this she preferred to watch the video together with her athletes:

Because I found in the past that gymnasts, especially when they first begin watching themselves on video, are very harsh and only see the worst parts. And it can be, for

some girls, particularly those perfectionists, can actually be a negative thing, because they don't like what they're seeing. So I really like to guide them so that video analysis is a positive thing as well as being constructive. I like it to be affirming of what they're already doing well. (Kelly)

By having a coach always watching the video together with the gymnasts, this coach felt that she could ensure the gymnasts experienced the video in a positive way. The coach's concern with a negative effect from gymnasts using a video system was confirmed by Darden (1999). He describes how students typically experience a phase of "shock" including "negative feelings" when first seeing themselves on video, however argues that students move forward from this feeling very rapidly once they use the video for a longer period (Darden, 1999, p. 42).

Because, during the six week period, none of the actants in the rhythmic gymnastics network gave the system the attention and focus equal to that of a coach, the system was not integrated into the rhythmic gymnastics network in the way that it was in trampolining. Instead, it was integrated as a teaching tool for the coaches, with the assemblage 'coach' now extending to include the computer system. As such, the coach became a cyborg, a "hybrid of machine and organism" (Haraway, 1991, p. 149), combining their own knowledge with the software technology and becoming a more effective entity. In this case, human knowledge is combined with the software, creating what Haraway describes as a set of partial connections, allowing greater objective vision (Law, 2004, p. 69). It is arguably this objective vision that was appealing to coaches as for a sports coach or judge, objectivity is highly desirable in order to critique, evaluate and correct athletes effectively.

Thus, in rhythmic gymnastics, over the first six weeks, although the computer system was not used as often or by as many people as in trampolining, it resulted in the creation of a new actant: the cyborg-coach, whose effectiveness was increased with the addition of the system. So although in both trampolining and rhythmic gymnastics the system appears to have been effective for assisting training, in neither case was the technology integrated in the way the designer expected.

Conclusion

While studies examining the use of video feedback for improving sporting performance have tended to focus on the efficacy of video feedback for directly improving the learning rate, this chapter reveals that there are a wide variety of factors which affect whether video feedback will be useful for a particular training programme. Yet moving the video camera from the testing laboratory to the gymnasium is not a simple exercise. Baudry, Leroy and Chollet (2006) argue that in men's gymnastics, video feedback systems were not used in the gymnasium because they were too expensive and technically difficult. They argue that complex software programmes make the integration of video feedback into the gymnastics environment much easier as these programmes are cheaper and easier to use. Darren, a sports scientist, made the same argument for the worldwide popularity of the software programme Silicon Coach. While the interest in Robert's system which is easier to use and cheaper than other more complex software, suggests that price and ease of use are relevant, the range of uses that coaches and gymnasts described for video systems in gymnastics and the lack of use of video in the rhythmic environment suggests that there are a far greater number of factors affecting the use of the camera in the gymnasium.

The comments by coaches about the use of the hand-held camera revealed that a major difficulty with this system was its time requirement in being an assemblage that required rewinding to find the correct place on the tape. The inclusion of the tripod and the small screen as part of the assemblage were also argued by coaches to add to the problems of video being both time consuming to set up and hard to see.

The comparison between the trampolinists and the rhythmic gymnasts suggests that while coach attitudes and age and experience of the athletes are relevant, the set up and routine requirements of the prospective codes also played a large part in determining the uptake of the video system. The set up of the trampoline in allowing only one person on it at a time caused downtime which gave the trampolinists time to watch the video. By contrast, the rhythmic gymnasts were all able to practise on the mat at all times and therefore lacked the time to watch the video. This confirms how non-humans can act equally to humans in influencing the workings of gymnastics.

The following of the human and non-human actants through the network of each code also revealed a wide range of uses for video. The assemblage of aerobics, in including detailed choreography as a requirement in the Code of Points, resulted in video being used as a memory tool for the athletes to remember the exact details of the complex choreography after it was created. Similarly, the layout of the group rhythmic competition in including five gymnasts all directed towards judges on one side of the mat meant that the rhythmic gymnasts

used the video to check their synchronicity and timing. Neither of these options have been anticipated in the literature about the use of the video camera or by designers such as Robert.

As Callon (1991, p. 132) observes, technology can generate “novel, unpredictable and indeed previously unthinkable, options”. The task of implementing new technologies into the gymnasium is not as simple as designing technologies for a specifically useful purpose, as the human and non-human actants do not necessarily assemble as envisioned. Robert confirmed that a problem he has encountered is that coaches do not know enough about technology to be able to predict what they will find useful and have difficulty imagining new pieces of technology he describes.

This chapter also revealed the close connections between what could be considered the ‘macro’ organisation of the sport and the ‘micro’ workings. It was argued by several coaches that one of the reasons they do not have the time to analyse video footage is because in New Zealand, gymnastics receives no government funding. Therefore, unlike in countries such as Australia or China, where the government pays coaches large salaries to coach small numbers of gymnasts, coaches in New Zealand are generally forced to work with a large number of gymnasts to pay for their salary. This situation means that coaches feel they are busy all the time with the “large” squads and therefore lack the time to for extra activities such as video analysis. One of the few ways the government has provided some funding for the sport is through the mechanism of “carding” which is examined in the following chapter. In today’s sporting environment, both new technologies and sports science are considered as vital for improving sports performance (Shogan, 1999). While this chapter has examined how one type of technology has been integrated into gymnastics training, the following chapter considers the integration and enrolment of sports scientists.

Chapter 6

Expert Knowledge and Professional Confrontations

Our aim would not be to establish a general set of rhetorical rules for the construction of imputed interests, but to discover how it is that actors enrol one another, and why it is that some succeed whereas others do not. (Callon and Law, 1982, p. 621)

...the performance would not have come about without a choreographer... one or two coaches or ballet masters...and a dance dramatist... There are also costume, lighting and set designers, electricians, carpenters, property men and a stage manager...stage hands... choreologists...Physiotherapists, perhaps a psychologist, wig-masters and make up artists...Video technicians... photographers...(Wulff, 1998, p. 35)

Just as Wulff (1998, p. 35) describes the plethora of experts enrolled to create a ballet performance, this chapter examines the enrolment of outside experts into the production of gymnastics performances. While chapter four examined some of the enrolled actants such as the choreographer, the foam pit and the harness, and chapter five examined enrolled video technologies, this chapter focuses on the enrolment of people and skills that are usually classified as being part of 'sports science'. While the relationship between athletes, coaches and sports scientists may often be assumed to be of mutual benefit, this chapter reveals varying levels of success in enrolling scientists into the gymnasts' regimes and vice versa.

Scientists are enrolled by coaches, gymnasts, parents and clubs into the gymnastics network owing to their ability to see and reveal different aspects of the gymnastic body. In order to be successful, the gymnastic body needs to be operational at the highest possible level, and sports scientists are introduced in order to ensure the bodies operate in line with the consistently shifting demands of their sport. Through tools and training not usually held by gymnastics coaches, sports scientists can make the internal body visible. In this sense, they are different to gymnastics judges, who are experts at evaluating the external gymnastic body. Judges can only see the external body and thus if the gymnast can disguise any disruptions in the internal body, the judges will not deduct their work. By contrast, sports scientists are only interested in how effectively the internal body is working and are less interested in the external results which are the focus of coaches and judges. The position of sports scientists is somewhat difficult, as they are a very small group poised between wanting to improve sporting performance and being involved in scientific research (Terral et. al., 2009). As this

chapter describes, these contrasting foci can lead to conflicts between the scientists and coaches owing to their differing ways of seeing and different definitions of 'results'.

In being able to reveal the internal body, sports scientists may be enrolled in order to answer questions such as 'How long until my leg heals? How do I stop myself freaking out when I finally perform at World Championships? Why do I always go crooked when I try that particular tumbling pass? Why do I have no energy?' Although the coach and gymnast may have some knowledge that can answer these questions, the sports scientist, as an assemblage of particular training, knowledge and tools, is designed to provide answers. Abbott (1988) argues that the work of professions is tied to their specific professional knowledge. In the case of the gymnast, both the professions of the coach and the sports scientist are necessary as they each have specialist knowledge. The coach is an expert in creating the gymnast assemblage, whereas sports scientists have the knowledge of whatever aspect of medicine they have chosen to specialise in. Using the questions described above, the first question could no doubt be answered by a doctor or physiotherapist who would have particular testing techniques or use specific instruments which reveal details of the physical internal body to find the answer, and have specialist knowledge derived from their profession to interpret these answers (Abbott, 1988). A psychologist would perhaps be the best position to answer the second question through their ability to reveal and understand the inner workings of the brain, the third a biomechanist and the fourth perhaps a nutritionist or doctor.

In her study of the development of sports medicine in Canada, Safai (2007, p. 322) describes how providers of high performance sport "pride themselves on their ability to surround their athletes/teams and coaches with sports medicine clinicians". She identifies the large list of sports scientists and clinicians who are enrolled by the high performance providers as: physicians, sport physiotherapists, athletic therapists, physiologists, nutritionists and sports psychologists. However, she argues that the exact definition and breadth of disciplines which constitute 'sports science' or 'sports medicine' is debatable and difficult to pin down (Safai, 2007). In this chapter, the definition of sports scientists is what the participants used to define it (Latour, 2005). In interviews, all participants were simply asked whether they used any sports science support and what form this took. Some experts are introduced who would not conventionally fall under the sports science umbrella yet are included because the participants considered them sports scientists in light of their work with the gymnasts.

This chapter adopts a managerial perspective of ANT as introduced by Callon (1986). In his famous article examining the scallops of St. Brieuc Bay, Callon (1986) describes the enrolment process as occurring in three phases: problematisation, interessement and finally

enrolment. Problematisation involves defining the problem and identifying potential actants to be introduced to create a solution in the form of new scientific knowledge (Callon, 1986; Tatnall and Davey, 2005). For this new knowledge to be created, an “obligatory passage point” must be negotiated, which involves the aligning of actants and viewpoints otherwise known as “interessement” (Callon, 1986; Tatnall and Davey, 2005). “Interessement” consists of each actant reinterpreting the problem into their own concerns thereby motivating them to assist with a solution (Star and Griesemer, 1999), a practice which Latour (1991) describes as the alignment of points of view through the example of a hotel manager and hotel guests aligning their goals to ensure a hotel key is returned. Latour (1991) describes how the addition of a heavy weight to the hotel key ensures the keys are returned to the desk to the manager’s satisfaction and removed from the pockets of the guests to their immense relief, leading to a solution which satisfies both parties. While Callon (1986) describes the process of interessement as the researchers or scientist attempting to impose their point of view on the scallops and fishermen, Star and Griesemer (1999) argue that interessement is wider than the imposition of one upon the other, that it is the alignment of goals from multiple viewpoints that cannot be understood from a single viewpoint. The third phase, enrolment, involves the stabilisation of the roles of all parties involved in the creation of the new knowledge (Callon, 1986; Tatnall and Davey, 2005).

Problematisation

The goal of the high performance gymnast is to become the most effective hybrid possible according to the Code of Points. For the dedicated gymnast or coach or parent, almost every aspect of their life can revolve around this goal and a variety of knowledge is necessary to obtain it. There appear to be two main reasons why extra knowledge from a specialist may be required by the coach, gymnast or parent. The most commonly accepted rationale for enrolment of a specialist scientist is the unreliable nature of the human body. As every high performance gymnast in New Zealand has experienced, the human body frequently breaks down when attempting to become an effective gymnast assemblage and leads to the need for a specialist to be enrolled to fix the body. Specialists who are commonly enrolled for this reason are doctors, physiotherapists, psychologists, nutritionists and other medical specialists. In visiting a large international sports science conference, sociologist Peter Donnelly (1999) observed how the most dominant topic was rehabilitation and treatment of injuries, ahead of injury prevention. He suggests that the emphasis on treatment rather than prevention fulfils the sports scientists’ need for employment. He further noted how associated with this topic were a huge number of exhibitors selling a variety of tools “concerned with sports injuries and rehabilitation: pain relief, soft tissue and bone tissue healing systems, orthotics,

pharmaceuticals, rehabilitation products, and braces” (Donnelly, 1999, p. 457). These medical scientists are specialists in revealing the internal physical problems of the body and designing methods to rehabilitate a ‘broken’ body. They may use tools such as x-rays to examine the internal body, and tools such as those described by Donnelly (1999) to rehabilitate it.

The second reason a specialist may be enrolled is to improve the nature of an already working assemblage. These specialists could potentially include all the above scientists, as well as biomechanists and physical trainers. Their ability to reveal the internal body allows them to identify areas where the body’s efficiency could be improved which are not visible to the coach or gymnast. In these cases, there are no obviously ‘broken’ body parts which need to be fixed; the sport scientist is only enrolled to improve the efficiency of the body.

The goal of the sports scientist can be elusive. For many scientists, gymnasts, coaches and parents may provide a possible object of study. As sports scientists are also scientific researchers (Terral et. al., 2009), gymnasts are often used by scientists to test theories about how the body works. For example, there are numerous studies examining gymnasts which focus on injury rate (see for example Chilvers et. al., 2007; Cupisti et. al., 2007; Kolt et. al., 2004), nutritional intake (see for example Boisseau et. al., 2005; Jonnalagadda, Benardot and Nelson, 1998), gymnasts’ bone densities (see for example Dyson et. al., 1997; Nichols et. al., 1994), and the biomechanical analysis of gymnastic movements (see for example Bradshaw and Le Rossignol, 2004; Davidson et. al., 2005; Hiley and Yeadon, 2007; Hiley, Yeadon and Buxton, 2007). These groups all use gymnasts as objects to be examined, but in some cases, the scientists examine similar components to the coaches.

The dividing line between the sports coach and the sports scientist can be a thin one. The two groups both share the desire and knowledge to improve sporting performance (Terral et. al., 2009). Yet it is the production of academic research by sport scientists, as described above, that gives the profession of sports science its authority (Abbott, 1988). Coaches may have knowledge, but they rarely produce academic research or inscriptions of their knowledge. As will be discussed in more detail later in the chapter, in the case of gymnastics, sometimes the knowledge of the two groups can be identical. For example, a men’s gymnastics coach needs to be an expert in strengthening the body as performing men’s gymnastics requires a very strong body. Therefore the men’s gymnastics coach is likely to have as much knowledge as a physical trainer. Similarly, both men’s and women’s gymnastics coaches require an in depth understanding of biomechanics in order to coach effectively. Apparatus such as bars involve the gymnast flexing the bar rail to propel them around the bar. In order to work out how to achieve this, a coach needs to understand the physics and biomechanics behind it and this

requires a similar level of knowledge to a professional biomechanist. However, the separation between the two groups in New Zealand tends to be marked due to physical separation, differences in the tools utilised and an acknowledgement of differences in professional practice (Abbott, 1988). Coaches work in the gymnasium and are expert at working with equipment, gymnastic mats and even lifting bodies, while sports scientists exist in laboratories filled with often bizarre looking devices that are often technological in nature and produce research. With this physical separation in place, the gymnast and/or coach and/or parents must make a deliberate decision to enrol the scientist into being part of the gymnast assemblage and vice versa. As Abbott (1988) describes, many professionals establish the boundaries of what they do and do not do, and refer the latter out. As this chapter shows, coaches vary in deciding where the boundaries of their expertise are and when to refer the gymnast to a sports science professional. This chapter will track the various types and methods of enrolment of sport scientists that occur in gymnastics throughout New Zealand.

“Carding” – The Most Stable Form of Enrolment?

Safai (2007) identifies the inclusion of sports science services into a sports training programme as one of the most visible markers of the institutionalisation of sport. As early as the 1960s, countries such as the Soviet Union and East Germany perfected centralised institutionalised systems which included sports scientists as core components in athlete production (Safai, 2007). Similar systems remain in a number of countries with centralised gymnastics training programmes such as China and Australia. By contrast, Houlihan and Green (2008) describe how although sport science has been identified in several studies as important for athlete success, many non-Communist countries have been very slow to explore the potential of sports science as a regular part of the training programme. Collins (2007) describes how New Zealand, in historically spurning the concept of a centralised government-linked sport organisation, has only recently formally integrated sports science into high performance sport. In 2001, the creation of the Academy of Sport as an arm of SPARC specifically dealing with high performance and directly employing sports scientists (Collins, 2008), demonstrated recognition of the perceived impact sports science can have on elite sport. However, as government funding is insufficient for all high performance athletes to be provided with full sports science support at all times, New Zealand has developed a number of other ways for government funding to assist sport, including a government funded method for athletes to enrol sports scientists referred to as “carding”.

“Carding” is the most sought after arrangement for all athletes in New Zealand. Dyer (2006, p. 339) describes how The Academy of Sport aims to provide “carding” support for up to 1500 athletes across 21 sports:

These athletes received a card identifying them as being part of the academy system and were thereby known as ‘carded athletes’. Through the programme, carded athletes would be provided with applied sport science and medicine support, athlete career and education (ACE) advice, and have access to tertiary and education scholarships and sport specific training facilities.

NZG/GSNZ, as the national sporting organisation for gymnastics, is allocated a number of cards by SPARC which varies year to year, which they then allocate to athletes of their choice. “Carded” athletes are considered very privileged by the entire country and the services they are granted depends on their level of success. For example, in gymnastics prior to the 2006 Commonwealth Games, a gymnast who had represented New Zealand at the World Championships during the previous year was carded for a session every week for several months of whatever sports scientist he would like to enrol. By contrast, a gymnast who was a new member of the Commonwealth Games team in 2006 was only allowed to enrol a sports psychologist twice in the same period.

One of the reasons “carding” is particularly desirable for athletes is because sport sciences services tend to be very expensive, as rhythmic coach Meg described: “It’s really expensive. I think even for the lady that (gymnast’s name) went to, it was \$150 for a one on one for sports psych.” Government funding of these sessions therefore appears to be an ideal solution for athletes to acquire sports science support that few gymnasts would be able to afford otherwise. It appears that the goals align with the resources going to the best athletes.

Because the carding system is run by the government and applies to every sport, it is a relatively stable form of enrolment. The goals of the gymnasts, coaches and scientists are all aligned in creating a stable arrangement. The gymnasts and coaches want the scientists enrolled but are unable to pay, the scientists want to be enrolled so they can be paid and the additional actant of government funding creates a stable arrangement.

However, because it is the government who organizes the enrolment, the funding is given to the gymnasts by NZG/GSNZ without necessarily consulting the coach, or the gymnast. As a result, NZG/GSNZ may, from the point of view of the gymnasts and coaches, potentially enrol the ‘wrong’ scientists, or in the ‘wrong’ way. For example, rhythmic coach Meg

described how her athlete was allocated only one paid sports psychology session. Meg's gymnast felt that attending only the one session was not enough and wished to attend more, however even though sports psychology was the service she most needed, she was not allowed to use her other sessions, which were allocated for physiotherapy and nutrition, to have further psychology sessions, and instead voluntarily opted to pay for further sessions at a cost of \$150 per session.

This example demonstrates how gymnasts in New Zealand may utilise a mix of government and self funded systems. While the provision of carding support is similar in nature to the way countries with centralised systems such as China (Hong, 2008) include all aspects of training as government funded, the voluntary opting to pay for more services is akin to countries with no government funding.

As a coach who worked a full time job in addition to coaching in order to earn a living, Mike argued that the government carding system was unfair as it potentially gave the gymnasts services that were less crucial, instead insisting that the gymnasts pay out of their own pockets for more important services, such as coaching:

When (my gymnast) got carding, all that money goes to sports science. So some guy who's a sports massage (sic), he's getting paid to help (my gymnast), but I'm helping him more than the masseur, but I don't get anything. (Mike)

Further, because the athlete and coach do not always agree that their allocated sport science services are essential, the athletes do not always have the time or inclination to use all their allocated sessions. Interesement (Callon, 1986) therefore may not occur as the gymnast and the scientists are not in agreement that the service is essential. For example Matthew, a men's gymnast, described how although he had been given one of the highest levels of carding support, he had not actually used any of it as yet, despite being carded for several months at the time of the interview:

What I get and what I use are very different. I am intending on using it! But you get all your medical, things like massages, nutrition, psychology, all medical stuff, physio, any kind of advice stuff sports wise you're pretty much covered... I don't really want to use my doctors or physios because it would mean I'd have to go see them for something!! I'm planning on using, I get free massage once a week, or else I'm planning on using them, except for I never get around to ringing them, but that's starting today! I'm going to call them, and also I'm planning on using my psychology stuff. (Matthew)

With only two months until the Commonwealth Games at this point, when his card expired, it was unlikely that Matthew would have been able to use all his allocated services. Although the government, NZG and the scientists set up a system that would help Matthew, Matthew's own point of view never aligned with theirs about the necessity of his sports science treatment. In his interview, Matthew revealed that training 32 hours per week plus working part-time to cover his training costs and attending university part-time left him no time in the week for any activities that were not absolutely essential. As described in more detail later, Liam, in his interview, described how studies have found that the use of physiotherapy and massage can significantly decrease the number of soft tissue injuries experienced by athletes and therefore potentially lengthen the number of years the body can be effective in gymnastics. Despite the possibility of using these services to increase his 'gymnastics life' Matthew felt unable to sacrifice the time he had in any given week for these sessions. Also, Matthew was particularly busy training at this time as he was only two months away from leaving for the Commonwealth Games. At this time, Matthew and all his teammates were attempting to cram in as much training as possible prior to their departure to ensure they would be in top form at the games. Unlike in sports such as swimming or rowing, gymnasts rarely use any form of 'tapering'⁴² leading up to competitions. Instead most coaches believe that a large number of repetitions of routines performed prior to competition will result in a superior performance.

Another service that carding provides is monitoring the athletes' progress and how they compare to other members of the New Zealand gymnastics team. The athletes were required to attend a physical ability test on a monthly basis in order for these comparisons to be drawn. While presumably this service is extremely useful in other sports, in gymnastics the low numbers of carded gymnasts and the different stages of development of these gymnasts made the monitoring a pointless exercise. Rhythmic coach, Meg, men's coach, Mike, and women's coach, Jessica, all described cases where the two carded rhythmic gymnasts and the five carded men's gymnasts were at such different stages in their development and had such different body strengths and weaknesses that the comparative tests demonstrated nothing. Mike described:

You've got 5 athletes doing it. (Gymnast name) and (gymnast name) are 21 and fully developed. Then (gymnast name) is 16 and sort of developed, to (gymnast name) and

⁴² Tapering refers to the practice of reducing training to a lighter load immediately prior to an important competition, thereby allowing the athlete to conserve their energy for their performance.

the other guy from (club name) who are totally undeveloped, at 14 – 15 yrs old. So you've got 5 athletes and they give you a medium and it's not useful. (Mike)

Mike's complaints hinge on the differences he perceives in the bodies of the carded men's athletes at this time as a result of their different ages. Male gymnasts typically do not reach their full strength until around age 17 or 18, therefore it is no surprise that the athletes younger than this vary markedly from those in their 20s. The coaches argued that the differences in the test results are more likely to be the result of the age differences as opposed to their training programmes or natural abilities.

Further, as Jessica described, the tests were often carried out at different periods of the year with no correlation to their training schedule:

It's always done at a different cycle. Like, one time they'll be in the middle of a competition season and the next time they'll be in normal training, so you can't compare. (Jessica)

Jessica described how the temporal cycle of gymnastics does not match 'normal' linear time. While the testing is usually carried out either biannually or quarterly, gymnastics competitions are not evenly spaced throughout any given year and this results in gymnasts being at very different points in their training during each test. Zerubavel (cited in Adam, 2004, p. 107) argues that the calendar can be seen as an "expression of culture". In gymnastics, the gymnastics calendar determines how training is organised, how much time is spent on particular movements and skills depending on how far away a competition is. In New Zealand, although the usual competition season for gymnastics begins in May and culminates with the National Championships at the end of September, the calendar for elite gymnasts often includes international competitions at other times of the year. For example, in 2006 the Commonwealth Games were in March, forcing the gymnasts to be ready to compete at their best far earlier in the year than their usual training regime facilitated. The differing calendars of gymnasts, depending on which competitions they are attending, means that gymnasts have very different results in physical ability testing depending on when the test occurs within their gymnastics calendars.

Mike further expanded by describing how although there is the funding to have the athletes tested, there is no follow up or discussion with the coaches about the test results. He argued that it would have been useful for SPARC representatives to discuss the testing results with the coaches:

And you get that data back, but at no time do they sit down with the coaches and/or athletes and say this is what all the data means. What do we need to be looking for improvement wise? It's just, well, this is the data and you get a big wad of paper with it on. Like I say, I think it could be quite useful, but it needs to go a further step. (Mike)

In this case, Mike, as a coach, felt he required some sort of translation in order to understand the data generated for and by the sports scientists. Further enrolment of a translator would be required for the data to be used to maximum effectiveness. The data that Mike refers to is not necessarily generated only for the coach and the athletes. Instead, this data may form a useful database for sports scientists to use in research or to gauge the improvement of programmes or athletes over several years. For example, sports scientists Patria Hume and Kelly Sheerin together with an NZG representative Marie Stechman used the data from the rhythmic gymnastics DAP test, which was collected by sports scientists, to publish a paper specifically examining the test's efficacy (Hume, Sheerin and Stechman, 2006). For testing, the sports scientists enrolled the gymnasts to take the tests in order to provide them with data. The gymnasts were willing to be enrolled not because they had any wish to assist the sports scientists, but because they received their carding services as a result of attending the testing. Therefore in the case of carding, although the goals of the gymnasts in participating in the testing were completely different to the scientists, successful enrolment occurred because an obligatory passage point (Callon, 1986) was negotiated through rewarding the athletes which ensured both parties benefited.

Yet the fragile stability of the carding process reveals the power relationships between the gymnasts, coaches and sports scientists. The sports scientists are more than willing to align themselves to the goals of the government as they receive economic benefit and potentially prestige and status for doing so. Similarly, in most cases the gymnasts and coaches are also willing for the government to impose their system upon them as the gymnast is rewarded with a free service. The government has the power to enrol both groups owing to the government assemblage including funding. The stability of the system is threatened however, because the coaches and gymnasts do not always agree with the type of service the gymnast is offered, believing other services that are not offered to be of greater value. This results in the gymnasts potentially not enrolling the sports scientist, demonstrating they have the power to reject the government's funding if they do not perceive it to be beneficial. Although in this scenario the scientists are less empowered in choosing who they work with owing to them being obliged to service the athletes' as required by the government, the next part of this chapter describes methods where they are more empowered.

Voluntary Enrolment

The combination of the lack of carding services available to all athletes and the lack of confidence that coaches have in the carding system has led to coaches and athletes directly enrolling sports scientists into their own programmes. In several gymnasiums, the coaches directly approached scientists whom they believed to have expertise in an area where they needed help and enrolled them to give free services to the athletes. Kevin, a judge, explained that the sports scientists who come and work with the gymnasts for free may have obligations to do voluntary work as part of their job:

We have a physio come in. She comes in a couple of nights a week and works with the elite girls. Generally what's happened is we don't sort of have the money to pay them but they are required to do a certain amount of voluntary work, whether they're working within a clinic or medical centre so they're putting back into the community a number of hours. (Kevin)

Kevin describes a situation where from the viewpoint of the scientists, they may gain approval or promotion from enrolling themselves into a gymnastics programme. The goal of the coaches and gymnast, to create new scientific knowledge that will improve the gymnast's performance, is translated by the scientist into a way for the scientist to fulfil professional obligations and gain approval from their colleagues. Scientists also described enjoying being involved. One was observed to have a close friendship with the coach and others were proud to be contributing to programmes that they perceived to be effective.

There are four clubs in New Zealand who have sports scientists regularly visiting their elite athletes who do not expect payment. These scientists usually tend to visit the gymnasium about once a week and work with one or more of the athletes for a short time and confer with the coach. Three coaches: Jane, Amy and Tricia, described the set up they have with a sport scientist voluntarily visiting their gyms to assist:

I went and saw this guy not just for his chiropractic expertise... but he was also a sports psychologist... we set up several meetings where he promised that he would work with me for the long haul. Not just talking about getting these kids to world championships, it's got to be long term... I rely on him so much. The boys go and see him pretty much every week. He checks them physically, if they have any injuries whatsoever, he is their first medical point of call. And he, of course, with his expertise can forward them on to

specialists. Aside from that, over time, over the years, he's got to know these boys so well. They have an open relationship and conversation. The relationship has just been fantastic. He helps these boys and he will always, if he feels I need to know something about what's going on in their lives, of course it's a doctor patient relationship so he won't confide anything unless from a safety point of view, there's a safety aspect to it, he might ring me up and say, I know you've been on this kid's case, he's telling me that he's not been doing this or he's not been doing that but this is what's happening and this is why he's doing this, ah, I totally understand, thanks for letting me know. At the same time he checks them physically. (Jane, trampolining coach)

We have a very lovely man who is a sports psychologist who comes and works with our school guys. Every week... he's doing it all for free...He's a legend... I've seen an improvement and it's good for me to be able to distance some of that. Because what I find is I'm the be all and end all and I have to have all the knowledge. I have a little diploma/paper thing in sports psychology but I can't be everything. When I'm at training I want to just coach tramp. When there's an issue, it's nice to be able to say, well, (name of psychologist) is coming in tomorrow, let's deal with that tomorrow. Or I can say to them I know that you and (name of psychologist) have talked about that, what tools has he given you to deal with that? They don't need to tell me, they go "oh yeah, that's right." Sometimes they tell me and sometimes they don't. It sort of frustrates me a little bit when I talk to him because he's very general because he's not allowed to tell me anything because he's a professional. And I just trust it, and that's all I can do. (Amy, trampolining coach)

We're in a lucky situation; we've got a biomechanics specialist based in the building. So as well as doing conditioning programmes, he's done a couple of things for us... He's done a lot of work with artistic girls and boys on pliometrics and things like that. His biomechanics background is mainly in athletics and sprinting and now he's kind of converting. (Tricia, rhythmic coach)

In these three cases, the enrolment is more effective than carding as the goals of all involved are closely aligned. The coaches have enrolled the particular type of scientist because they believe they will be of assistance, the scientists want to be enrolled because they genuinely want to help or because they feel obligated to provide voluntary service, and the gymnasts are empowered to choose whether to accept the assistance of the scientist or not. Amy and Jane both described how their athletes chose on a daily basis whether to utilise the sports scientists or not, sometimes attending sessions and at other times choosing to train instead. Ken, a

trampolinist, described how he found the services of two different volunteer sports scientists which his coaches enrolled in this manner to be hugely helpful in reducing his back pain which had disappeared entirely as a result of regular sessions with one of the scientists.

Partial or One-Off Enrolment

While carding and free enrolment are highly desirable forms of enrolment, they are difficult for the majority of gymnasts to acquire. There are a limited number of cards allocated by SPARC and not all sports scientists wish or need to work voluntarily. Instead, the most common enrolment of scientists occurs as one off enrolments. These may occur with the coach, gymnast or gymnasts' parents enrolling a scientist to assist with a specific issue, or with scientists enrolling gymnasts or coaches to assist with a study. Usually these enrolments are for a single session only where the scientist is paid for their work by the gymnast or their parents.

The majority of gymnasts had at some point attended a joint session with either a nutritionist or a psychologist in order to provide gymnasts and parents with general information and skills. Some gymnasts, such as trampolinist Esmerelda, described how they had attended a large number of these sessions at sports camps for talented athletes of all ages. In other cases, such as women's coach Jessica described, it was something that the coaches organised in the gymnasium and asked each gymnast to pay a small amount to cover the scientist's fees. Mary, a rhythmic coach, described how she found sessions like these extremely useful both as a way of imparting new knowledge and as a reminder, using the example of how she enrolled a dietician for a one off session:

Dietician is the other one I use occasionally, and invite the parents. They prepare the meals and do the shopping. And that's where you get some interested and some not, but most of the parents are pretty good. Even the ones who are trained in nutrition say it's still good to hear it. (Mary)

Mary emphasises the importance of the parents in the gymnast assemblage, as those who prepare the meals for the gymnasts. She acknowledges that they are empowered to control the diet of the gymnasts and she is happy that most parents choose to utilise the knowledge gained from these sessions to benefit the gymnast assemblage.

However, many coaches and athletes said they found these sessions disappointing as the information was not necessarily specific to their sport and their situation. Mike described the

difficulty in finding a nutrition expert who understood the long and demanding training hours of gymnastics:

I don't believe that a lot of the nutritionists actually know gymnastics well enough to give expert advice. Which is not to say they couldn't learn, they've obviously got the knowledge but they don't know the sport well enough to help. (Mike)

Esmerelda, a trampolinist, agreed with Mike, describing how many sports science sessions she had attended focused on other sports, including artistic gymnastics, but omitted trampolining:

How do I apply it to tramp? They've based it on netball and rugby and they'll go "how many rugby players? How many cricket players?" (Artistic) gymnastics is totally represented, but I went with another rhythmic gymnast once and they didn't mention our sports (trampolining or rhythmic gymnastics) once the whole time we were... That's the hard thing, finding someone – and I mean, where would you find someone that's trampoline specific? (Esmerelda)

In his discussion of eating practices of rhythmic gymnasts, Johns (1998) describes a case of a nutritionist struggling to assist a gymnast because the gymnast was unable to articulate the exact weight she was required to be. Johns (1998) highlights how although the judges and coaches have an idea about how a gymnast should ideally look, this is not always translated into a form that a nutritionist, who is an expert on the workings of the internal body, is able to help with. Kelly, a rhythmic coach, described how she translates the needs of a rhythmic gymnast to be at the lowest end of the healthy weight range. When one of Kelly's gymnasts and her mother visited a nutritionist, Kelly instructed the mother to ask the nutritionist for advice about how to stay at this weight, an instruction the nutritionist was able and willing to work with.

Nutritionists are probably one of the most commonly enrolled scientists by both parents and coaches. Whitson et. al.'s (2006) study of the knowledge level of sports coaches in the USA about assisting athletes with eating disorders found the coaches acknowledged the necessity of having knowledge of nutrition and eating disorders and that they would like more education about these matters. The stereotypical view of gymnasts as promoted by the media and the literature described above assumes that gymnasts are required to be very thin and face a great deal of pressure to be so. Natalie, an aerobics coach, exemplifies this discourse and aimed to distance herself and the code of aerobics from this image of gymnastics by

commenting that the aerobics athletes were different from the gymnasts: “And so we’re not talking your little gymnasts who’ve been told to live on a lettuce leaf and a carrot stick.” In New Zealand, between the codes and among the coaches within each code, coaches place varying degrees of emphasis on body size. In the majority of cases however, even if a thin physique is considered desirable, the emphasis is on acquiring the appropriate physique while maintaining high energy levels. Anna described how although she is tough on her gymnasts with regard to weight, it is not because she wants her gymnasts to necessarily be super thin, but because she feels maintaining a consistent weight is a necessity for gymnasts to train safely. She gave the example of performing a double back somersault one day, and performing it the next day with a 2kg weight belt around the waist as being highly dangerous, arguing that gymnasts need to have a consistent weight or they will get hurt performing difficult skills. In another gymnasium, a coach was observed to become angry and frustrated with a gymnast who had low energy levels once the coach had discovered she had skipped lunch that day. He insisted that the gymnasts must eat lunch before coming to training or it was a waste of time.

Corina, a rhythmic gymnast, described how her coach organised for her and several of her teammates to visit a nutritionist who gave them individual eating programmes. Corina was surprised that as a result she lost weight without making significant changes to her diet:

And we just went and they just looked at our diets and stuff and basically rearranged it. And without even really changing anything, I lost so much weight personally. Because I went to the nutritionist once and then I came back after I’d been away for a period and she just couldn’t get over how much we’d changed. Just from slight diet changes.
(Corina)

Corina went on to describe how she had become more knowledgeable about the effects of different foods and now very rarely chose to indulge in junk food. Similarly, Corina’s teammate, Barbie, described how she had “changed to a treat a day, only one treat!” as a result of visiting the nutritionist.

While Corina and Barbie were clearly motivated to listen to the nutritionist and alter their eating habits, other coaches described how they found visits to the nutritionist to be a waste of time because the athletes lied to the nutritionists about what they normally ate. Natalie, an aerobics coach, described:

...the hardest thing is dieticians. And it's not that the dieticians aren't good, they are good, the ones we use. The problem is getting the athlete to listen to them... They don't necessarily give all the information. For example, the dietician tells them to fill out a food diary for 3 days. So they change their diet for those 3 days. (Natalie)

Amy, a trampolining coach, described the same experience of athletes doctoring their food diaries. Like the scallops described by Callon (1986) the gymnasts have mixed responses to aligning themselves to the plan set out by the scientists. While some agree with the scientists' reasoning that a proper diet is necessary to training and competing well and align themselves to this task accordingly, others reject this as a necessity.

Natalie's and Amy's experiences highlight the difficulty of making the internal workings of the body visible. Although blood tests reveal more severe problems such as low iron, there is no way for the nutritionist to know the precise food consumed by gymnasts short of following the gymnast around and observing exactly what they eat. The literary device of the food diary is created in order to make food intake visible, however it fails to work because the gymnasts fail to enrol it. Johns (1998) described how in his study he discovered an incident where some gymnastics coaches physically locked gymnasts in their hotel rooms while away on tour in order that they could police the gymnasts' food intake.

In New Zealand, similar frequent horror stories circulate amongst the gymnasts. For example, one New Zealand judge described how when she was judging at an international competition, one of the top Russian gymnasts was riding in a lift with her while carrying a chocolate bar. The lift stopped and the gymnast's coach got in, and before the coach could notice the gymnast's chocolate, the gymnast had thrust the chocolate bar into the New Zealand judge's hands and mimed to her to pretend it was hers so her coach would not know she had chocolate. Similarly, many of the coaches now coaching in New Zealand had negative experiences regarding food from when they were gymnasts, such as one being told that she should only eat an apple for breakfast and a glass of red wine and a square of chocolate for dinner. As a result of these stories and the coaches' experiences, coaches appear to be fearful of causing any sort of eating disorder and avoid ever suggesting that a gymnast may be too large. Instead, coaches often go to extreme lengths to couch suggestions regarding food intake in health orientated rather than weight orientated language. For example, gymnasts are told that they should aim for the low end of the healthy weight range as an ideal weight, or that they need to work on their strength-to-weight ratio, or they need to eat more healthily so they have more energy.

As previously discussed, Esmerelda and Mike both commented on the lack of knowledge some nutritionists have of gymnastics. The idea of requiring a scientist who specifically understands gymnastics is not confined to the area of nutrition. Other areas where coaches commonly doubt the specialists are medicine and physiotherapy. This leads to coaches, parents and gymnasts deliberately only enrolling particular doctors or physiotherapists who they believe have sufficient gymnastics knowledge. For example in Christchurch there is a physiotherapist who is a retired dancer, whom many of the parents and coaches of the rhythmic gymnasts believe to be the only physiotherapist in Christchurch worth sending the gymnasts to as they 'understand' rhythmic gymnastics.

The eagerness to find a physiotherapist with specialist knowledge is fuelled by numerous examples of physiotherapists or sports doctors clashing with gymnastics coaches over injury treatment. The common point of view of the sports doctor or physiotherapist is that treating gymnasts is extremely difficult because gymnasts never take enough time off for their bodies to completely heal. By contrast, from the point of view of the coach, there are very few sports doctors or physiotherapists who understand how difficult it is for gymnasts to take any time off at all if they want to be successful. The two groups have very different conceptions of time, and how time should be utilised most effectively to produce a successful athlete. From the coach's point of view, a 'good' doctor will say to a gymnast with, for example, a leg injury, that they can still attend training but they must do nothing that will impact on their injured leg, instead they can practise any exercises which involve arms only. There was an example of a women's artistic coach who had been a very successful gymnast who described how the only time she became very good at uneven bars was when she broke her leg and could do nothing but bars for several months. Her experience of missing almost no training due to injury and instead working on the parts of gymnastics her body was fit for is considered the 'standard' practice by high performance coaches and gymnasts. Therefore, a 'bad' doctor or physiotherapist will not understand this and insist that an injured gymnast completely stop training to give the entire body a rest. The expectation for gymnasts to continue training despite being hurt mirrors the findings of other studies in the sociology of sport, which argue that playing while injured has become the norm within the "risk culture" (Nixon, 1994) of high performance sport (see for example, Curry, 1993; Curry and Strauss, 1994; Nixon 1994; Roderick, Waddington and Parker, 2000; Young et. al., 1994)

Abbott (1988) points out how the professionalised nature of the medical profession involves doctors making diagnoses purely based on the medical facts of the case without any regard for the client's extraneous qualities. In the case of the gymnast, it follows that a physiotherapist will make a diagnosis and plan for treatment based on the most effective way to heal, as

opposed to taking into account the gymnasts' scheduled training. In turn, the coach, also as a professional, is only interested in the gymnasts' injury in terms of how it will affect their gymnastics training. Both the coach and the scientist, as professionals, only view the body with interest from their own respective specialties.

From the point of view of the coach, it is problematic when a parent or gymnast enrolls a doctor or physiotherapist to treat an injury who recommends stopping training completely, a very common occurrence. Usually, a parent who attempts to explain that their child has been told to take time off from training by a scientist is met with great disapproval by the coach, who will then attempt to align the parent to their own way of thinking and convince them to ignore the doctor's advice, which the parent may or may not do.

Many coaches pre-empt this situation through pre-enrolling a scientist of their choice. There are several coaches who have organised for a physiotherapist whom they trust and whose ideas are aligned with their own, whether paid or unpaid, to visit their gymnasium regularly to ensure that the gymnasts are all treated in a way that the coach agrees with. Alternatively, when a gymnast sustains an injury, the coach tries to insist that they visit a particular doctor or physiotherapist. Natalie, an aerobics coach, described how in her opinion, it was very difficult to locate sports scientists who she felt were good at their job and could be relied upon to help her athletes:

I mean, I'm lucky because I was (job title) at (name of tertiary institution that dealt with sport) so I had everyone in the offices all around me so I'd just go "I need an athlete to come and see you, you and you!" Contacts are a wonderful thing! And particularly important with things like dieticians if you've got any athletes you're worried about as far as eating habits go. There's a lot of misinformation that goes on out there. It drives me nuts with athletes... You've got to be careful about who you pick and who the athletes go to. (Natalie)

Jessica, a women's coach, described how she found a physiotherapist located close to the gymnasium that she encouraged her gymnasts to visit because she knew that he was both well qualified and his point of view was aligned with her own:

We've got a physio next door... We encourage all of the gymnasts to go to him. They don't all go to him. We know he's good, he's a sports science provider and he's good accreditations and he talks to us. So he'll come over and say "so and so's hamstring is really making progress, he can do a bit more tonight." (Jessica)

Having a physiotherapist available for the gymnasts at any time is often considered an example of ‘best practice’ in gymnastics. Coaches and gymnasts often give examples of overseas gymnasiums where there is a physiotherapist on call for the gymnasts to ensure they are healthy. This is particularly the case in countries with centralised government funded systems. For example, Liam, speaking about an overseas gym he had just visited and his own training from when he was an elite gymnast in a different country, described:

There’s a physio that sits in the back room and he sits and waits until people come in when it’s needed. They’ll come in and say I’m going to vault now I need my ankle strapped and he’ll do it. When we had our national sports centre, I would walk out of my gym, probably about 100 paces was my physio. I’d have physio, I’d have lunch and I’d go back to the gym. I’d have physio, I’d have saunas, whatever I needed to do to make my results possible... It was proven, I think, I don’t have the paperwork, but when we had massage at least 2-3 times per week we had 60% less soft injury within our squad... It was a rough paper. But less soft tissue, well, you can have a break and there’s not much you can do about that, but soft tissue, I’m a great believer in preventing rather than post injury, which is what I’d like to do but I’m not able to do. So I’m just doing whatever. (Liam)

Similarly, in her autobiography, U.S. Olympic gold medallist Kerri Strug described how she had physiotherapy every day as a part of her training and how it was one part of training that no gymnasts would ever miss because gymnasts always have “something sore or niggling” which physiotherapy would help with (Strug and Lopez, 1997, p. 39).

In rhythmic gymnastics, one of the fundamental components is for the gymnast to throw and catch their equipment. Karen, a rhythmic coach and judge, described how she had specifically enrolled eye specialists in the past when it seemed a gymnast had problems catching her equipment:

We’ve had girls in the past who are forever dropping, and you think “they’re a good gymnast, what’s going on?” and then they’ve had their eyes tested. And you find that one part of their eye vision isn’t working well and they’re given exercises. It’s an expensive test but it’s always enforced by (club name). (Coach name) is very good at picking up that one. It’s quite a few hundred dollars. They give them exercises that strengthen their eyes, and it works, it’s really good. Some people might have just a little blank spot in one point; they’re never getting their throw right. You can see their hand

there but they always miss it. And it's one part of their eye is lazy. You'd need to speak to the specialist to give you more scientific data about it. (Karen)

As Karen describes in her final sentence, she has no knowledge of the science behind optometry and therefore, unlike in areas such as nutrition or psychology where a coach may have some knowledge, it is crucial that the gymnasts visit an optometrist. They must visit the scientists in their own surgery as the optometrist uses particular tools to make the internal workings of the eye visible which are not portable. Once the optometrist identifies any problems with the internal workings, they can then set exercises to fix the problem which are beyond the scope of the coach's knowledge but will result in a great improvement in the gymnast.

Alison, an aerobics competitor, described how for her, having her eyes tested and getting contact lenses made a huge difference to her skill level:

I got my eyes done... the guy picked up that there was something wrong with my eyes. My elements improved so much when I got my contacts because I could actually see where I going. I could never catch in push up, and he said to me "you can't see the floor coming", and if I train without my contacts in I can't see the floor coming. I can't judge distance. And so all my spins, I could never turn because I couldn't see... then I got my contacts and I was like, yes! (Alison)

Karen also described a one off enrolment of a specialist that is not really a scientist but is enrolled in the same way: a stylist. The stylist is not generally viewed as a professional in the way that a scientist is due to their perceived lack of academic and therefore legitimate and worthwhile knowledge (Abbott, 1988). Yet in gymnastics, the stylist is enrolled as an expert in the same way as a scientist. Karen described how the stylist would choose what colour leotards the gymnasts should wear to flatter them most effectively:

And we've had their colours done, to make sure you've got the right colour leotards for your gymnasts... We went through a session where some mums stopped consulting with the coach what would be good to wear, and the gymnasts would come out in these lovely new leotards with all this expense that would look dreadful on them. It'd do nothing for their skin... She would come in and show the girls which colours would look good on their skin. It was good for someone like (gymnast name) who was very pale to find colours that would really look right. At one stage we were very serious, we would look at floor colours and which leotards would look best on them. (Coach name)

was very into that. The Bulgarians look at that, I know lots of them do. So you know you're going on to a blue floor, it's no use wearing a blue that's a similar because you get lost – doesn't show off your skills as well. (Karen)

The stylist is enrolled because of their expertise in creating attractive appearances. While doctors and physiotherapists are enrolled because of their ability to understand and improve the workings of the internal body, the stylist is an expert on the appearance of the external body. As the gymnast will be judged by another human, making the gymnast look attractive by everyday standards is likely to enhance the impression the judge receives of the gymnast. The idea of dressing gymnasts a particular way has been used for many years as a way to draw attention to the gymnasts. For example, one of the world's most celebrated coaches, Bela Karolyi, describes how he deliberately set the stage for his gymnast Nadia Comaneci's unprecedented victory in 1976 by dressing the Romanian team in red with white bows in their hair (Karolyi and Richardson, 1994). Similarly, more recently, the head coach of the Australian women's team, Peggy Liddick, deliberately began dressing the Australian team in hot pink in order to make the team stand out (Anon, 2000).

The enrolment of sports scientists into gymnastics programmes also occurs in the reverse direction, where sports scientists enrol gymnasts in order to complete sports science research. Amongst the large body of sports science research which analyses some component of gymnastics are a number of New Zealand studies that were completed through sports scientists specifically enrolling gymnasts to complete their studies. For example, McClymont and Burley (2000) enrolled five trampolinists to complete a study examining the efficacy of the bungy harness in trampolining training. Similarly, Kolt et. al. (2004, p. 195) enrolled "20 competitive gymnasts... from two clubs in Auckland, New Zealand" in order to complete a study on the effect of a stress management programme on stress and injury levels. Darren, a biomechanist, described how he enrolled a gymnastics club to test a theory, however the study could not be completed:

We did a project with (club name) a few years ago where we looked at contact time, it's like putting contact mats under the floor and we found that we couldn't guarantee the direction. The athletes were doing a sequence and they were missing the mats. And in the end it was a waste of time and so we flagged it. To get a mat that was wide enough would cost \$3000 US before they shipped it. It wasn't worth it for the feedback so we flagged it. (Darren)

Darren reveals how this test was unsuccessful due to the gymnasts and mats being a highly unstable assemblage. Darren describes how he considered replacing the mats with mats the gymnasts could assemble with more easily, however obtaining these mats was beyond his budget.

In all these cases, the goals of the sports scientists were directly related to improving the performance of the gymnasts. As this is also the primary goal of the gymnasts, interestment was mostly able to occur because the gymnasts, scientists and equipment were generally willing to work together.

Non-enrolment

The majority of discussions around sports scientists and coaches assume from the outset that it is the coach who can learn from the sports scientist. It is assumed that the scientists have specialist knowledge which it will benefit the coach to learn. As Darren, a sports scientist and employee of the South Island Academy of Sport described: “(My) job at the academy is more aimed at the coach, making the coach a better coach”. Darren’s role involved visiting coaches from a variety of sports and using his scientific expertise to identify their needs and introduce technology that would assist with those needs. However, coaches with great confidence in their knowledge often do not enrol sports scientists because they have had experience of scientists interfering in their programme that they believe to be running well. For example, Anna, a women’s coach, described how one of her athletes visited a sports psychologist in order to reduce her fear of performing a new skill. The psychologist then made suggestions to Anna to assist the gymnast which Anna, using the knowledge derived from her coaching experience, believed were absurd. A direct consequence of this was that Anna made a deliberate decision not to enrol any other psychologists into her programme. Liam, another women’s coach, agreed with Anna’s view that his own psychology training was sufficient and that enrolling a psychologist could in fact confuse the issue: “I’m not a great believer in it. I think that sometimes psychology can make you think too deep rather than thinking about what you actually need to do.” Like the scientists in Latour’s *Pandora’s Hope* (1999b, p. 27), Anna and the psychologist came to the gymnast’s problem with two different sorts of training that resulted in differing opinions about what was going on. Latour (1996b, p. 27) describes how “If all her knowledge as a botanist makes Edileusa side with the forest, all his knowledge of pedology makes Armand lead toward the savanna.” Similarly, Anna’s coaching knowledge

leaned her in a different direction to the psychologist with specialist psychology knowledge⁴³. In confirmation of Anna and Liam's opinion that they had sufficient psychological knowledge on their own, Cote et. al.'s (1995) study of the coaching skills of seventeen high performance gymnastics coaches found that the ability to psychologically prepare gymnasts for competition was considered a standard skill held by high performance gymnastics coaches.

Lack of enrolment of sports scientists on the part of coaches also comes about because, as in both Anna and Liam's cases, coaches have often attended and passed numerous classes in sports science in order to gain their coaching qualifications. They possess the same academic knowledge that legitimises the sports science profession (Abbott, 1988). In New Zealand, all coaches need to have attended some short sports science sessions in order to be permitted to coach on the gymnasium floor, a practice which is policed at competitions⁴⁴. Many have either a Bachelor of Teaching or Coaching which required them to pass sports science courses. Coaches who have studied in other countries are often even more qualified. For example, there are now a large number of coaches in New Zealand who received qualifications under the former Soviet run system. These coaches were required to attend four to six years of university where they passed numerous courses in sports science disciplines as well as specialist gymnastics courses. These coaches often especially resist enrolling specialist sports scientists as they believe their own knowledge to be equal to or greater than many New Zealand sports scientists. For example, Amy, a trampoline coach, described how although she enrolls nutritionists to give talks to her trampolinists, she monitors their eating and their food diaries and she describes herself as having qualifications in this area. Similarly, Jessica, a women's coach, described how she saw no need to enrol a sports psychologist as she majored in sports psychology at university.

The strongest example of how coaches may have identical knowledge to sports scientists causing them to resist enrolment occurred in the area of biomechanics. Judy, a biomechanist and women's coach, described the crossover between the work of the artistic coach and the biomechanist to be a "grey, murky area" with both roles having a great deal of similarities. This became very apparent through the lack of enrolment of a biomechanist, Jim, who happened to have offices connected to a women's and men's artistic gymnasium. Jim

⁴³ In this particular case, Anna also felt herself proved correct in her actions as the gymnast started performing the skill without fear a relatively short time after this incident.

⁴⁴ In New Zealand there are several levels of coaching qualifications which dictate what level of gymnast the coach is qualified to coach. There are three levels of coaching qualifications: recreational, junior and senior coaches. At many competitions, only coaches that the national body have on record as of the appropriate level are permitted on the competition floor. For example at the National Championships, only coaches who have junior or senior coaching qualifications are given accreditation.

described how he had found the high performance coaches in the club to be disinterested in his help, whereas the lower level coaches were. Jim showed me how, through using his computer, he had assisted a non-high performance coach with teaching a gymnast a highly difficult skill. Jim and the coach used a method of trial and error. The gymnast would attempt something, then Jim would video it, take it back to his computer, analyse it, compare it with other top athletes, then come back to the gym and suggest corrections. The gymnast would try it again and Jim would repeat the process until they succeeded. Although ultimately Jim's method resulted in the gymnast eventually learning the skill, this approach contrasted very strongly with how a very experienced and successful high performance coach⁴⁵ in another gymnasium taught the skill. The experienced coach directed the gymnast to perform a number of carefully crafted "lead-up" drills before attempting the skill. He changed the gymnast's conditioning programme to ensure they had the necessary strength and flexibility to perform the move. Then the gymnast worked through a number of 'progression' skills, until finally attempting the skill with the coach assisting, and then by themselves. Cote et. al. (1995) described exactly this system as the dominant method used by coaches to teach gymnasts new skills. A priority of this system is the fact that the gymnast is safe when attempting the skill for the first time. By contrast, when Jim's gymnast attempted the skill, he landed very painfully a number of times. Despite this, because Jim was successful in teaching the skill to a gymnast, he made the assumption that this ability would be a useful tool for the high performance coaches and was surprised they did not want to work with him. He was not aware that the high performance coaches felt they already had the knowledge that he wanted to provide. This led to Jim losing respect for the coaches in assuming they did not want to learn from him, and the coaches losing respect for Jim in assuming he did not want to learn from them.

Abbott (1988) describes how challenges to professional activities are not successful if the challenger is disorganised. In the example described above, Jim was never organised enough to challenge the coaches for the right to coach difficult skills. His claim would have needed to be backed up by superior knowledge and skill, which was not evident from the point of view of the coach. Therefore, an obligatory passage point was never reached. While both Jim and the coach at the other gymnasium identified the necessity of the gymnast learning a new skill, neither believed in the need to be allied to the other in order to succeed at the task. Instead, Jim believed in the alliance of himself, a video camera and his computer, while the coach believed in the alliance of himself and his knowledge with a number of different pieces of

⁴⁵ This coach had in the past coached both World and Olympic medallists in gymnastics

equipment that facilitated various drills. Each identified a different assemblage or set of alliances as a necessity for completing the task.

Conclusion

This chapter has unpacked the black box of 'sport science support' that is often cited as crucial to sporting success. There is little disagreement that the inclusion of the scientist into the gymnastics network can be highly effective for improving the gymnast assemblage. Yet as this chapter reveals, not all assemblages which include sports scientists are perceived to be useful. While certain scientists, such as doctors, are almost always considered to have expert knowledge not held by coaches, their enrolment is often still restricted based on how the addition of doctor will affect a gymnast's training. Other scientists, such as psychologists and biomechanics, are deliberately not enrolled by coaches owing to the coaches' belief that the scientists hold no extra useful knowledge than that already held by them. However, the coach is not the only person capable of enrolling sports scientists. Owing to their ability to financially compensate the scientists, parents or the government are also responsible for enrolling scientists into the gymnastics network. As coaches may not always agree with these enrolments, coaches instead attempt to enrol the scientists they want, searching for scientists who will voluntarily work willingly together with them, or by enrolling them for one off sessions and charging the gymnasts to pay the scientists. As the parents are frequently the ones paying for the sports science service, they are highly empowered to choose who to enrol even if the coach does not agree with their choice. Yet even once enrolled by the parent, the gymnast is empowered to enrol them or not. They can choose to take on suggestions from the scientist or not.

Enrolment also occurs in the other direction, as scientists enrol gymnasts to their work. As in the majority of cases, when the scientists wish to study the gymnasts with a view to improving some aspect of gymnastics, gymnasts are usually very willing to agree to be enrolled. In other cases, the gymnasts are required to be enrolled in order to receive other services from the sports scientists, such as in the case of carded athletes being required to attending bi-annual physical testing.

This chapter shows how following who 'enrols' and who is enrolled reveals the power relationships between the different groups in gymnastics. It is found that coaches, parents, gymnasts, sport scientists and the government are all empowered, either through possessing knowledge, money or the body of the gymnast, to affect how enrolment occurs and it can vary extensively depending on the perceived needs of the gymnast assemblage from each group.

For interrelationship to occur, all groups need to be aligned in agreeing, even if it is for different reasons, that enrolment will have a positive affect on the gymnast assemblage. Power relationships are further considered in the following chapter, where the network is followed beyond the New Zealand training environment to the sites of gymnastic competitions both within and outside of New Zealand.

Chapter 7

The Art of Judging Art: Unpacking the Orange Box

Black box: “a fact, a technology, a technique – the internal workings (contingencies, heterogeneities, politics, etc.) of which are obscured: all that we see are what goes in and what comes out.” (Michael, 2000, p. 131)

“And that orange thing, that’s where you enter the score.” (Alyssa, women’s gymnastics judge)

The process of judging in gymnastics is heavily black boxed. To the audience member, the performance of a routine is the ‘input’ which goes into the judges’ table and a few minutes later the ‘output’, in terms of a numeric score, is displayed. This chapter is concerned with unpacking the black box of gymnastics judging and describes the intensive labour that is involved in judging a gymnastics routine. Just as the previous chapter revealed the black box of sport science support to consist of a range of methods of enrolment which were at times very complicated, this chapter reveals the fragility of a supposedly reliable system that dictates the results of gymnastics competitions. As discussed in chapter two, judging is a heavily debated area of gymnastics owing to the belief in the fallibility of the human judges. This chapter shows how this belief has led to the FIG implementing new technologies to improve the reliability of judging, however it is found that these technologies are not necessarily always enrolled.

The Translation of Movement to Score

In order for a sporting competition to occur, the rules of every sport must have a method for determining a winner. In some sports, such as swimming or running, this is a relatively simple matter with the winner being the person who completes a particular distance in the fastest time. In these sports, the numbers describing the time taken to finish the race translate directly into a ranking system. However, in a sport such as gymnastics the rules for finding a winner are far more complicated. The method employed for ranking gymnasts involves using people who are trained in watching a gymnastics routine and translating it into a score, mediated by a range of non-human actants. As this chapter describes, this process is highly laborious.

As gymnastics has evolved, the sport has developed ever more complicated rules in order to attempt to ensure that all gymnasts are judged equitably. The history of the sport demonstrates how the rule book, the Code of Points, has become larger with every new edition in reflection of the increasingly elaborate system that is used to judge gymnastics (Kerr, 2003). The complexity is now such that in some codes, particularly rhythmic, understanding and interpreting the rules can have as much influence or impact on a routine's score as the way the gymnast performs on the day. As described in chapter four, the role of the coach and choreographer now involves the ability to interpret the Code of Points and translate it into creating high scoring routines, as well as teaching gymnasts particular movements.

Sports rely on methods of evaluation that incorporate clearly set out rules. Methods which involve empirical, checkable data are generally more acceptable. Empirical data can be more easily obtained through using technological devices which can directly convert the performance to a score without human intervention. For example, in swimming competitions, the moment swimmers touch the end of the pool, they can then look up at the scoreboard to see their times. In races which are very close, it is common to see all swimmers rush to look up at the scoreboard to see who won. This can be seen as an 'ideal' form of evaluation for sport, as the performance translates smoothly into a number in order to rank performers and establish a winner. A smooth translation such as this allows little scope for controversy, with the times recorded generally accepted as the correct outcomes.

Evaluation in sports which are perceived to have a subjective element to them, such as gymnastics, figure skating and synchronised swimming, are more complex. The wide number of skills, the range of movements and skills called for, and the requirement of some form of artistic interpretation mean that there is currently no technology able to perform the direct translation such as the stopwatch performs for swimming. In gymnastics, the translation is instead performed by a human judge in combination with a variety of other actants which will be described throughout this chapter.

One of the major tools that all judges assemble with is the rule book: the Code of Points. The Code of Points is a universal inscription describing the method of translation that judges should use⁴⁶. As an inscription, it is widely circulated throughout the world ensuring that all international judges and all countries competing in gymnastics receive the same information. For the last several years, the Codes of Points for all codes of gymnastics have been freely

⁴⁶ The Code of Points for that code is written by the FIG Technical Committee. The Technical Committee is a group of the highest level judges who are voted on following each Olympic Games and remain in place for the four year Olympic cycle.

available from the FIG website, allowing very wide circulation. The Code is rewritten every four years, following each Olympic Games, and is often also updated or changed throughout the year, so it is imperative for there to be a method by which all judges, coaches and athletes around the world can easily obtain this regularly updated information. The assemblage of the inscription combined with the website is crucial for the information in the Code of Points to be circulated. As this chapter reveals, any knowledge or information that is not inscribed and therefore circulated, and therefore only exists in the heads of the judges and coaches, is difficult to obtain and can cause problems at competitions.

The Code of Points includes a method of notating the movements the gymnasts perform. Every movement performed in gymnastics that can be awarded a numerical value has a particular written symbol showing that movement. For example, here is an excerpt from the women's Code of Points which shows the amount of points to be awarded for performing various types of front somersaults on the balance beam:

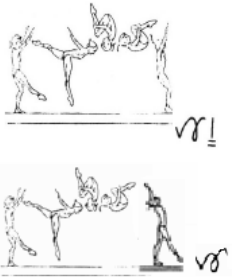

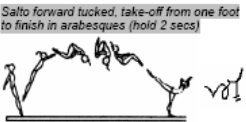



| A | B | C | D | E | FIG |
|-------|-------|---|--|---|--|
| 5.119 | 5.219 | <p>5.319 Salto forward tucked, take-off from one leg to land on one or two feet</p>  | <p>5.419 Salto forward tucked to cross stand</p>  <p>Salto forward tucked, take-off from one foot to finish in arabesques (hold 2 secs)</p>  <p>Salto forward piked, take-off from one foot to land on two feet</p>  | <p>5.519 Salto fwd piked to cross stand</p>  | <p>5.619 F - Salto fwd tucked with 1/2 twist (180°), take-off from both legs</p>  |

Fig. 7.1 Excerpt from the Code of Points for Women's Artistic Gymnastics 2005 – 2008 (FIG, 2005, p. 37)

This excerpt is from the section describing forward acrobatics for balance beam in women's gymnastics. Each column is worth a different value: A is worth 0.1, B is 0.2, C is 0.3 etc. Each movement includes a written description at the top, followed by the drawing of the move being performed, and after it a symbol representing that movement. The symbols are used as a shorthand language for describing routines.

The shorthand language allows inscriptions of gymnastics routines to be created which are submitted to the judges prior to the competition. The judges can read the symbols and immediately understand what the gymnast will be performing. In some codes, gymnasts

receive deductions if they deviate from the script provided to the judges, while in other codes they are simply judged on what movements they perform regardless of the script. A crucial step in the translation, however, is the way the Code of Points is interpreted for the routine, by the human judge.

The Judge

The judge is a human trained to ‘see’ gymnastics. All judges must complete some form of training exam in New Zealand before they are qualified to judge at competitions. The gaze of the judge does not look at gymnastics for pleasure or interest, only for evaluatory purposes.

Before judges are permitted to judge at any competitions, they must complete a course to learn to translate gymnastics into a score. Unlike the sports scientists described in the previous chapter, judges have no methods or tools at their disposal to reveal anything beyond what is presented to them at the competition. The internal workings of the body are irrelevant and invisible to the judge who can only see and judge the external body in motion. If the external body appears to be effective according to the dictates in the Code of Points, then the judge will translate its movements into a high score. The Code of Points then becomes the translatable tool which judges rely on to convert the routine to a score.

The judge usually begins by learning what the simplest movements in gymnastics look like. Within New Zealand, the highest levels of judges in the country run courses to teach new judges. The new judges are shown videos of high level gymnasts performing these movements so they can see what the ideal looks like and then shown the corresponding diagram and name of the movement according to the Code of Points. Judges are then taught how many marks to deduct if the movement does not look identical to the ideal. Therefore the judge is taught how to identify a gymnastics movement, and how to deduct marks if it does not conform to the ideal. For example, Alison described how one year, one of her routines was used in judging courses as an example of good artistry in the way she moved, but bad artistry because she used too much expression:

I was used once... they said: “Oh look, Alison moves twice as much” my movement was amazing, they said I was amazing because of that. I was the only one to turn my closed V and when I finished I was like “woohoo” with my face, and because I opened my mouth they used that in every single judges course around that world as that was an example of “NO!” (Alison)

In Alison's case, she was used to demonstrate the 'ideal' movement for a sufficiently artistic routine, but her facial expression was used to demonstrate what to deduct for.

The 'ideal' for each movement varies immensely from code to code, even if to the spectator the movements appear the same and are named the same. For example, a simple back somersault in the air is judged very differently in artistic gymnastics and trampolining. In trampolining, all movements must include a "kick out" where the gymnast straightens their body at the 12 o'clock position and are deducted if they do not. Artistic gymnasts are not required to "kick out" and are not deducted if they do not. This rule makes sense considering that the trampoline, as a bouncy surface, allows the trampolinist to have a far greater time in the air compared to a gymnast and therefore has the time to kick out, while an artistic gymnast is working with far shorter air time-frames.

The 'ideal' may also be a source of contention between coaches and judges who 'see' the gymnast for very different purposes. This particularly occurs at the lower or middle levels in gymnastics. At these levels, high performance coaches are coaching with a view towards future success. These coaches do not necessarily see exactly what their gymnasts are performing at that moment; they see what they perform in terms of what it will allow their gymnasts to learn next. Therefore coaches may often emphasise sections of the movement that do not conform to the ideal taught to judges, in order to improve the gymnasts. Judges may then deduct for these. Coaches also complain that the judges' expectations of ideal do not conform to what the human body is capable of. Coaches claim that the diagrams in the Code of Points are stick figures and therefore not accurate representations of the human body, yet they think the judges expect gymnasts to look exactly like these figures. As a result of their differing ways of seeing, judges experience frequent criticism by coaches and vice versa. In one gymnasium, an argument was observed to take place between a high level coach and a judge over how the judge had judged one of the coach's gymnasts at a competition the week before. The coach demanded an explanation for why the gymnast had received such a low score. When the judge explained, the coach then complained that the judge was completely wrong about the technique involved, that in his view, if the gymnast had performed the way the judge wanted, it would have actually been the wrong biomechanical technique. The judge simply disagreed and continued to argue that she was correct about the technique. The two agreed to disagree. After the judge had left the gymnasium, the coach said he just hoped that she would not be judging his gymnasts on that same apparatus at any other competitions.

In New Zealand, disagreements over judging can be compounded as judge education is not very comprehensive owing to the difficulty in finding people who wish to become judges. In

New Zealand, judging is purely voluntary yet it requires judging for multiple weekends per year. As a result, it can be difficult to find volunteers willing to spend this much time judging. The judge education system contrasts strongly with other countries. One judge described how in her view, the New Zealand judging education system was inadequate in comparison with Canada's:

I really think that there's a huge lack of education here. Basically, I have my Level Three here, which is equivalent to the Seventh Level in Canada...I think the Level One is like one day and the Level Two is two days. In Canada, the Level Seven was like Thurs, Fri, Sat, Sun and you have to do time (practising judging) in the gym. (Meg)

In the USA there are far higher incentives for judges to become educated and experienced as judges are paid for their efforts. As a result, even low level competitions in the USA are filled with high level judges who want to judge as much as possible to earn extra money.

In New Zealand, there are three levels of judges, simply called Level 1, the lowest level of judge, Level 2 and Level 3. On top of this, there is also an international category of judge called a Brevet judge. Brevet judges are the only judges permitted to judge at large scale international competitions such as World Cups, World Championships, Commonwealth Games or Olympic Games. Within Brevet judges, there are a further four Categories. Most Brevet judges in New Zealand are Category 4, the lowest category, although at times New Zealand has had some Category 1 judges, who are designated the top approximately 24 judges in the world based on their score in a judging exam and how they have judged at previous competitions. Although it may appear in gymnastics that the judges have the final say in determining the winners, judges are also subject to evaluation from other judges and the FIG, as described later in this chapter.

All gymnastics competitions include large numbers of judges. At the international level, there may be up to fourteen judges judging a single routine. One of the reasons why there are so many is that the judges each have different translatory roles. There is no single judge who translates an entire gymnastics routine, instead, the translation is broken up into a number of factors which different judges evaluate. These vary from code to code. For example, while every code includes judges who judge difficulty and execution, aerobics and rhythmic gymnastics also have judges who specifically judge artistry as a separate component. Each of these different translations are combined together to create the final score.

Execution

In all codes, the individual execution judge begins with a score of 10.0. As the routine plays out, the execution judge deducts marks from the score of 10.0 every time they see a mistake. A mistake may be something as large as a fall from the apparatus, which will result in a large deduction such as 0.8, or it could be a slightly bent leg, which will result in a small deduction such as 0.1. The judge takes deductions for any ways that the gymnast does not conform to the ideal as described in the Code of Points. The most usual way the execution judges produce their score is to write down the deduction on a sheet of paper as the gymnast performs their routine. Some judges may write the symbol of the movement performed, others simply write the deductions down, so their piece of paper has written on it something like: 1, 1, 0, 2, 5, 3, 0, 1, 2, 1. Each number corresponds to a mistake made in the routine. The judge then adds these numbers up, writes the total on another small piece of paper⁴⁷, and then sends it to be circulated, as will be described later.

Difficulty

Judging difficulty involves adding up the numerical value of all, or depending on the code it may be only the several highest, movements performed in a single routine. Thus, in contrast to judging execution, judging difficulty is an additive process. The judge will only add the numerical value of the movement if the gymnast performs it sufficiently well. They may choose not to 'count' the score for a movement in the final score if the gymnast makes a mistake when executing it. For example, if a gymnast performs a large mistake, such as completely dropping the apparatus in rhythmic gymnastics, the gymnast will not receive any of the numerical value for that skill from the difficulty judges. In addition, they will lose extra marks from the execution judges for dropping the apparatus.

Like the execution judge, the difficulty judge usually ends up with a list of numerical values for each skill that they then add together. However, the difficulty judges are also generally provided with pieces of paper which have the symbolic inscriptions of the routines written on them. This allows the judges to very easily follow the routine and allocate the numerical value to each skill next to where it is written. The sheets are particularly crucial in rhythmic gymnastics, where there is so much variation between the movements, the gymnasts and the apparatus that if these were not notated, it would be very difficult for the judge to work out what the gymnast was attempting to perform.

⁴⁷ For example, the above numbers would refer to one tenth of that amount, so these would add up to total deductions of 1.6, or an execution score of 8.4 out of a possible 10.

In most apparatus, the gymnast is restricted in how much difficulty they are able to perform. For many apparatus, including all rhythmic and aerobics routines and women's beam and floor exercises, there is a time restriction which acts as a limiting factor. Most of these routines have a time limit of 90 seconds. On these apparatus, the gymnasts attempt to cram as many difficult movements as possible into the space of time that is allocated. This has led to fans complaining that routines like this are boring to watch, since they consist of the gymnast only moving from each difficult movement to the next without any time for expression or flair.

Similarly, in trampolining the gymnast is restricted to performing only 10 bounces on the trampolining bed in a single routine. Because trampolining does not use linear or clock time, instead using bounces to restrict the length of the routine, linear time becomes an expression of the excellence of the routine. A longer routine in linear time is almost certainly a better routine as it means that the gymnast will have been bouncing higher in the air and therefore performing a greater number of movements. The same occurs in women's uneven bars and men's pommel horse, where there are no time restrictions beyond what the body is able to perform. Long routines on these apparatus are likely to be high scoring as it means the gymnast is more likely to have performed a greater number of movements.

Artistry

There are only two codes which include separate judges for judging the artistry of the routine: rhythmic gymnastics and aerobics. Both these codes include a musical accompaniment for all their routines and include the ability to express the music as a significant part of the judging criteria. Therefore judging artistry requires the judge not only to see, but also to listen to the music. In rhythmic gymnastics during 2005 - 2008, judging artistry further evaluated the movements of the equipment. While difficulty in rhythmic evaluates what the gymnast's body does, judging artistry evaluated what the equipment does. Because the movement of the equipment is considered as important as the movement of the body, in rhythmic gymnastics the judging of artistry was split between evaluating expression, including interpretation of the music, and the performance of the equipment. In New Zealand, judging artistry is perceived as the most difficult type of judging. New rhythmic judges are first taught to judge only execution, then difficulty and finally artistry.

In a reflection of the instability of the sport and how much the rules can change, in 2009, rhythmic gymnastics was altered so that artistry no longer included judging the equipment.

Instead, for 2009 – 2012 there are two kinds of difficulty judges. Judges called “D1” judge the difficulty performed by the body, judges called “D2” judge the difficulty performed by the apparatus, and “Artistry” judges judge the musical interpretation and expression.

Artistry can be the aspect of the routine that can be the most subjective to judge, as opinions vary between different judges, coaches and athletes about what is artistic and what is not. In order to overcome this, the Code of Points breaks down artistry into a number of components. In aerobics, this is highly explicit, with the artistic score of 10 being broken down into five scores of 2 for various components of the routines such as the use of the whole floor area and the music. With this breakdown, a judge therefore does not give their own overall artistic score, but must award a score based on the five components deemed to make up an artistic routine. In rhythmic gymnastics from 2005 – 2008, the rhythmic Code of Points included examples of marks that are scored for using the equipment in particular ways, such as throwing it into the air and catching it, or creating particular patterns with the ribbon. However, there were still some marks in rhythmic gymnastics that were not broken down clearly in the 2005 – 2008 Code of Points, allowing judges to award a possibly highly subjective score based on their opinion of the overall artistry of the routine. As described in the previous paragraph, the new Code of Points for 2009 – 2012 completely reworks the judging of artistry in an attempt to solve this issue, by making artistry a separate category and describing particular deductions for particular errors, such as being out of time with the music, or a break in the flow of the routine.

The “Extra” Judges: Line, Time and Synchronicity

Every code also includes several ‘extra’ judges who judge a variety of components that can be included in the score. The first kind of ‘extra’ judge is referred to as a “line judge” and their role is to determine if the gymnast or their equipment leaves the designated performance area. For example, on men’s and women’s floor and all rhythmic gymnastics routines, there will be two line judges, one on each of two opposite corners of the floor. These judges watch the two lines of which they can see the full length and deduct marks if the gymnast or their rhythmic equipment moves outside of the square that the routine must be performed within. The second type of judge simply times the routines for those routines which have a time limit. In New Zealand, this does not always take place at every competition, although it always will at the National Championships. These two types of judges can be less qualified than those who judge the other components of the routine as they require less expertise. The third type of judge is specific to synchronised trampolining. Their role involves evaluating the

synchronisation of the two trampolinists. Although this sounds simple, this can be extremely complex, and will be discussed in more detail later in this chapter.

Tolerance

Every code operates with a concept that the marks awarded for each component must be somewhat similar to the marks given by other judges judging that area. There are always at least two judges, judging each of difficulty, artistic and execution, and these two judges must be within “tolerance”. However, the exact amount of difference allowed varies between codes, the number of judges, the numerical score and which area they are judging. For example, in rhythmic gymnastics in New Zealand, difficulty scores from 2 – 4 judges should be within 0.3 of one another. By contrast, Alyssa describes how in women’s gymnastics, the amount of tolerance varies depending on the final execution score: “it’s basically 0.2, 0.3, 0.5 depending on the scores coming out. So if you’re (the judges’ total score) getting an 8.2 you (the other judge) shouldn’t be more than .5 away.”

Stuart described how competitions vary immensely in terms of how hard they are judged, and that as a judge, it can be difficult to ensure you are within tolerance. He described his experience judging at the World Championships:

...after the first few scores, I knew where the scores were going to be. You get a feel for where the scores will be on the day. And it does vary at different times depending on who’s up first and other things. At the all around finals I was in 0.2 for the first 2 scores, so I knew I was in range, then the next 20 routines, I was within 0.1 of being on the score, so you can’t get any closer than that. So I was pretty pleased with that. But the scores weren’t where I would have put them. I’m normally heavy on deductions, which is what they’re trying to push with the new Code anyway, but I would have been down at about 0.1 or 0.2 on those routines. (Stuart)

Stuart reveals that although the Code of Points is written in a way that suggests there is a correct way to judge routines, there is still variation between how ‘heavy’ judges are. This suggests that Stuart feels the inscription in the Code of Points provides insufficient information for judges to use this as their only translatable tool, an idea that Savrami’s (2001) analysis of rhythmic judging also found. In this case, Stuart felt the correct scores should have been lower than they were however he recognises that the most important thing is to produce an outcome where a winner can be identified and the gymnasts ranked, and as such chooses how hard to judge according to the situation on the day.

The amount of tolerance can also vary because there are very particular regulations for where judges are required to sit in a competition in order to see all angles of the routine. This is one of the reasons that tolerance can sometimes be as high as 0.5, instead of requiring all judges to agree on a score. This is particularly relevant on apparatus where the apparatus itself can obscure the movements of the gymnasts, as Stuart and Alyssa describe:

But especially if you're sitting on some apparatus where you can't see the same things. Like on pommel, if you're looking up like that, you can't see the legs on the other side, but then neither can the judge on that side, so it gives you a little bit of variation there. (Stuart, men's gymnastics judge)

If you're in front of the vault judging, you have quite a different view to someone sitting 8m away on the other side. So we do get a bit of change in vault. You get a bit of change in bars too because of the degrees of turn. I mean, it's 0.5 for past 30 degrees and if you're in the middle, that's great, but if you're at one end or the other...! (Alyssa, women's gymnastics judge)

Stuart and Alyssa both describe how seeing the routine from different angles can result in a different score being awarded by different judges, meaning there could be a wide range of execution marks.

The seating arrangements of judges also configure how choreographers and coaches construct routines. While the Codes for both men's and women's artistic gymnastics require judges to sit in positions surrounding the apparatus, the rules of rhythmic, trampolining and aerobics all require judges to sit in a line facing the apparatus. As a result, routines are constructed to give judges the most flattering view of each movement performed. Donna, an aerobics coach, described how for an aerobics trio routine, she once had one member of the trio who could not yet perform a particular move properly. As a result, Donna re-choreographed the routine so the better competitors were in the front during the move the gymnast could not do and consequently obscured her: "At this one competition we knew one of the trio were going to miss something so we stuck her at the back and had the others lift and nobody noticed and they qualified." Donna describes an anti-programme designed to achieve a higher score without strictly following the rules.

The Calculation of the Score

Once all the various judges have allocated scores for their various areas: execution, difficulty, artistry, time or lines, these scores must be accumulated into a final overall score. The formula for calculating the score is different for every code. In 2005 – 2008, men's and women's gymnastics discarded the highest and lowest execution scores, averaged the remaining three scores, then added this score to the difficulty score. Trampoline added the three middle execution scores then added difficulty. Aerobics added all three scores, while rhythmic averaged difficulty and artistry and added it to execution.

In local competitions, the judges write their scores on a piece of paper. They are then passed, or taken by a “runner”⁴⁸, to the Head Judge⁴⁹ for that apparatus. Occasionally, the Head Judge may query a score from one of the judges and will not allow the next competitor to begin until s/he has talked with the judge. Once the Head Judge has checked the scores, they are then passed or taken by a runner to the volunteers in charge of results. In all codes, the scores are calculated using computer software. The role of the results volunteers is to enter the scores from the pieces of paper that have the judges' scores written on them, allowing the computer to calculate the final score for that gymnast on that apparatus. Sometimes, the Head Judge asks to check the score before it is displayed. It is then usually displayed for the benefit of the gymnasts and the audience using some form of scoreboard or projector.

In an international competition, judges do not use pieces of paper to record their scores. Instead, they enter the scores into an “orange box”, which women's judge Alyssa described as: “just like a phone keypad”. This box sends the score to the laptop held by the head judges, which instantly calculates the score. However, a judge at the 2006 Commonwealth Games described how she had not only had to enter her score into the orange box, but write it on a piece of paper as well. The number on the paper was then checked by the Head Judge to confirm it was the same. Then the marks were double checked by the Apparatus Supervisor⁵⁰ before the Head Judge signed off the marks for the final score to be calculated and displayed. In this case, these dual systems of paper plus orange box provided a back up system so both could be cross checked.

⁴⁸ Usually the runner is child such as a gymnast not involved in that particular grade of competition who literally “runs” between the judges and wherever their scores need to be taken to.

⁴⁹ For each round of competition, one of the judges is designated the Head Judge. Usually this is the highest ranking, or most experienced judge judging at the competition.

⁵⁰ At international competitions, one judge is designated as the Apparatus Supervisor for that competition. The Apparatus Supervisor is a high ranking judge and may also be a member of the Technical Committee.

While pieces of paper, as used in New Zealand, allow the scores to be circulated, the orange box allows the score to be circulated and calculated. Due to the cables between the orange boxes, the individual judges' scores can be entered into the boxes and immediately displayed along with the gymnast's total score and their rank. In this way, the constantly changing outcome of the competition is continually on display to all competitors and spectators. At most competitions in New Zealand, orange boxes are replaced by pieces of paper on which scores are written. Rather than scores being instantly translated, they are instead translated by humans once the piece/s of paper reaches the destination of those responsible for producing results. These humans work as hybrids of humans plus computers to produce the score. The human must type the scores into the appropriate parts of the screen to produce a score. If they type the scores into the wrong part of the screen, such as on the wrong apparatus, then the incorrect score will be calculated.

The software used by each computer varies from code to code due to the different calculation formulas used by each code to produce a score. In trampolining and aerobics, these calculations are the simplest as these codes have no 'overall' score to be calculated. Athletes in these codes compete on a single apparatus. If they choose to compete on more than one, their scores are not added together as they are in artistic and rhythmic gymnastics. As a consequence, in these codes all scores and rankings can be easily displayed as the competition goes along. Rhythmic gymnastics is the next simplest because although there are several apparatus added together to create a total score, only one competitor can compete at any one time because all apparatus in rhythmic use the same floor area. As a result, rhythmic gymnastics competitions require the least amount of physical set up, but take the longest time to complete per number of competitors. The most complex to calculate are men's and women's gymnastics as both these codes have more than one competitor competing at any one time and all require an overall score to be calculated. Without the orange boxes and their connecting cables, it is very difficult for results to be calculated throughout the competition and keep spectators and gymnasts apprised of the continually changing rankings. At the National Championships in 2006, it was planned to attempt to use software and cables to imitate the orange boxes for artistic gymnastics, however the software proved unreliable and this was not able to be done. Since then, pieces of paper with runners have been proven to be the most reliable method to circulate the scores. At the same Championships, although software and cables were used for trampolining, the system broke down for about 20 minutes because a cable running underneath the tumbling floor was split by the pounding on the tumbling floor by the competitors.

The Unreliability of the Judging System

At the international level, gymnastics has included judging scandals on a regular basis almost since its inception. There are numerous cases of gymnasts and coaches feeling they were judged unfairly or incorrectly for a range of reasons. One of the most famous occurred at the Athens Olympics in 2004 where Paul Hamm was incorrectly crowned the Olympic champion as a result of a judging error. In a reflection of the emphasis on the human as opposed to non-human in the study of sport, there have been several studies examining the process of the human judge translating the mark. Judging studies examining artistic gymnastics, rhythmic gymnastics and figure skating have found examples of judging errors as a result of nationalistic bias (Ansorge and Sheer, 1988; Dixon, 2003; Ružena, 2000), expectations of success (Findlay and Ste-Marie, 2004; O'Brien, 1991) and genuine mistakes (Ste-Marie et al., 2001). In accordance with Latour's (1991, 2005) argument that sociologists have neglected researching the non-human and instead purely focused on the social, none of these studies pay any attention to the non-human actants that mediate the judging process and allow it to take place. This chapter shows how the non-human actants can influence the scores as effectively as the human judges.

Within New Zealand, judging errors, mistakes or perceived injustices are equally common. For example, at the 2008 National Championships, there were such a large number of protests over the judging of the artistic gymnastics competitions that the organisers ran out of official protest forms after only the first of the five days of competition.

As Ste-Marie et. al. (2001) observe, judging can be a highly demanding activity. In New Zealand, although a single competition session is not allowed to be more than three hours long to prevent gymnasts, coaches and judges becoming overly fatigued, such a session may involve a judge judging 100 different routines, and 4 – 5 sessions may be scheduled in a single day. Dierdre, an aerobics judge, described how exhausting she finds judging:

It's actually really stressful. When you're sitting there from 8:30 in the morning till 6pm and you're listening to all kinds of hideous music and looking at routines, you think to yourself I need to go home now because my brain is fried. (Dierdre)

As a result of such exhaustion, full concentration for every part of every routine can be extremely difficult. With even a second long concentration lapse, a judge may miss seeing, and therefore judging, a vital movement or error. There are numerous occurrences of mistakes of this nature taking place. These mistakes are particularly common in rhythmic gymnastics

owing to the inclusion of “sheets”. In rhythmic gymnastics, all gymnasts at all levels must submit their full routine written out in symbols to the judges prior to the competitions. Whilst judging, the judges then know what the gymnast is trying to attempt and judge the performance based on how it conforms to what is written on the sheet. Gymnasts who do not adhere precisely to the inscription on the sheet receive a deduction. However, the addition of the sheet to the judging process means that judges must watch both the gymnast and the inscription at the same time which proves very difficult. At one competition, a judge complained to a coach that the sheets she had submitted for her gymnasts were so complicated the judges did not have time to read them and judge the gymnasts correctly. The judge suggested to the coach that in her opinion, if she were to design routines that were easy for the judges to read and understand then her gymnasts would almost certainly receive higher marks.

Mistakes also occur in the transcribing of the score. The judge may have seen every move in the routine but written down the wrong number, or added up the numbers incorrectly. Frequently, judges write down and pass on simply the total numeric value of the mistakes, not the list including each individual error. The volunteers calculating the final results do not receive the judges’ notes which include all the deductions which added up to the total number, so the score given to the results people could be wrong simply due to the judge miscalculating. One judge in New Zealand is renowned for her terrible mathematical skills and constantly worries that she has made calculation errors.

As the judging process also involves the computer, the computer can also act to influence the score. Computers may crash in the middle of the competition, add up the score incorrectly by applying the wrong formula, or develop bugs in the software that mean the score cannot be calculated. It is extremely important to have the correct software working for the calculation of the score to occur reliably. Consequently, software programmes that perform this job reliably are in high demand. In artistic gymnastics and trampolining, New Zealand has purchased commercial software which reliably calculates the score. In aerobics, a simple Excel spreadsheet is used. In rhythmic gymnastics, a highly complex Excel spreadsheet is used. With the large changes that occurred to the rhythmic Code for 2009, an expert programmer had to be enrolled to update the formulas in this spreadsheet for it work effectively.

Gymnasts and coaches tend to be fairly forgiving of any kind of mistakes where there is obviously no hidden agenda on the part of the judges, such as computer breakdowns or calculation errors. By contrast, coaches frequently complain about judging that they perceive

to be biased. Studies have shown that many judges at the international level are biased towards certain nations, often judging their own nations more leniently, and their strongest competitors more harshly (Ansorge and Sheer, 1988; Dixon, 2003; Ružena, 2000). At the local level, this kind of bias most commonly translates into bias based on the gymnastics club represented by the gymnast. In New Zealand, judges are required to be registered as a member of a gymnastics club in order to judge. Presumably, this is a local translation of how internationally judges must judge for a particular country and are usually required to be citizens of that country to do so. As most judges begin as either gymnasts, parents or coaches already involved in a club, it is usually a fairly straightforward matter for a judge to choose a club to be registered with. However, there was one judge who objected strongly to this rule as she believed that as a judge, she should be permitted to be neutral and not associated with any club. NZG would not allow her to judge unless she was registered with a club, and consequently she registered herself with a very low level club who had very few competitive gymnasts as she perceived this to be the closest she could obtain to being neutral.

As a result of judges being registered with clubs, there is a perception that some judges may be biased towards gymnasts from the club they are registered with. Some coaches boycott competitions held by clubs⁵¹ where they perceive this bias to be too strong. For example, one coach from Christchurch described how he preferred for his gymnasts to compete in Auckland rather than Christchurch because he believed his gymnasts tended to receive an average of 0.5 higher marks in Auckland owing to the presence of numerous rival club judges in Christchurch. He argued that the Christchurch judges from the rival club constantly gave gymnasts from their own club far higher and undeserved scores than his gymnasts.

Aside from bias, there can also be large differences of opinion between judges about what deductions should be taken and what movements should be counted. In New Zealand, a source of great consternation is the differing knowledge levels of various judges and coaches, particularly at the senior international level where gymnasts are eligible for competing in World Championships. While the Code of Points acts as the main translatable tool for judges, there appears to also be a great deal of knowledge gained by judges from judging at international competitions which New Zealand coaches and judges do not necessarily have. For example, one rhythmic coach, upon travelling overseas for the first time, discovered that many movements that she thought were banned, from her own interpretation of the Code of Points, were instead being commonly performed by other nations. As this information is not

⁵¹ In New Zealand, all competitions apart from the National Championships are run by clubs. Clubs can opt at any time to run competitions, or they can apply to the regional/national body (depending whether it was during NZG's time or GSNZ's) to do so.

inscribed in any manuals, newsletters or emails, there is no way to obtain it beyond talking with others at competitions. Even a video of the competition, such as on YouTube, would not reveal this information as the details of what movements have been counted and what has been deducted in any given routine are not published.

Coaches and judges who have relocated to New Zealand to coach commonly complain about the judging in New Zealand, citing it to be very different to overseas. Meg, a rhythmic coach, argued that the rhythmic judging is far too harsh in New Zealand:

I think they judge TV (difficulty) really harshly here. They're getting over two points higher overseas than they do here, at the trial. That's huge. And I think it's because here, they don't count the big skills. They go, oh, it's a D or an F and so it's like NO. They couldn't possibly do that! And there (overseas) they say "Wow, she can do that!"
(Meg)

By contrast however, a Russian rhythmic coach visiting New Zealand remarked that the rhythmic judging in New Zealand was far more generous than in Russia. Either way, there is definite agreement that it varies from the judging in other countries.

Coaches and judges in New Zealand agree that New Zealand's isolation as a country makes it very difficult for New Zealand judges to keep up with the overseas trends, as Meg described:

It just seems that because we're obviously in the middle of nowhere that we don't travel and because most of the stuff happens in Europe it's hard to get there it's very hard to get a lot of information. They had to change stuff in (gymnast), (gymnast) and (gymnast)'s routines because of lack of information over here, but it was common knowledge in the US. And I asked the Brevet judges here, did you know that? And they were like, No! (Meg)

To counteract the problem of New Zealand's isolation and the difficulty of acquiring information, Stuart described how he has created his own methods to ensure he receives the necessary information:

And then when it comes to international stuff, we don't get too much exposure in NZ, but in terms of videos and practice stuff, which is available, we've got a bit of a network of friends around the world who judge at different competitions and that sort of thing as well... You get to build relationships with other judges... I've now got a group

of friends who are judges, some old, some young, from all different nationalities.
(Stuart)

Stuart feels that getting to know a large number of judges from around the world gives him the resources to ask questions and clarify matters that may not be clear from his own analysis of the Code of Points and that are not inscribed anywhere else. Alyssa suggested a different method for judges to keep up to date with new judging information. Alyssa argued that it is very important for New Zealand judges to judge in overseas competitions because judges are given instructions by the Head Judge prior to the competition which add to the judges' knowledge:

If a judge goes to the judging meeting prior to the competition and if things have been highlighted as being a problem during the meet and they tell the judges to take note of this, this and this and take note of that, that and that, then they need to pass that on to the team. (Alyssa)

Alyssa argued that if judges attend a judging meeting at an international competition, this ensures they have the information to be passed on to other New Zealand judges, coaches and gymnasts. While Alyssa's solution sounds obvious, it is often difficult to ensure that New Zealand judges are able to judge at international competitions. New Zealand must first have competitors competing in the event and a judge with the necessary qualifications that makes them eligible to judge, but further the judge must have the money to attend the necessary competitions. Alyssa also described how throughout her long judging career, she has self funded several international trips as well as received some funding from NZG or FIG:

...if they're sending open teams away they need Brevets and for Worlds they have to be a certain qualification. They have always (sent judges with New Zealand teams) in the past but it's not so definite in the future because there's no funding. Like Pacific Alliance they sent one fully paid and the other two had to pay their own way... In 1991 I paid my own way to go to Indianapolis, in 92 I paid half the way to go to my judging course – I've got a long memory – 94, 95, 96, 97 FIG paid for me to go, 99 New Zealand paid for me to go. (Alyssa)

Even when judges do travel overseas and receive information, it has become apparent that judges do not always receive the same information. Stuart explained that this even happens in the judging courses that teach the interpretation of the Code of Points:

With the new Code, there are new rules brought to the meetings, then it all gets cleared up and printed early in the New Year. That's the hard thing we're looking at at the moment. At the course in Australia, (judge) was taught something different to what I was taught, so at the trial at the weekend, we ran it how it was taught at the world courses rather than at the continental courses. (Stuart)

Stuart refers here to there being different types of Brevet courses held. The "world" or intercontinental courses are the most important and attended by the top judges in the world. The intercontinental course is taught by an FIG technical committee who was part of writing the Code of Points. Coaches who pass this course are then empowered to run other courses in their particular continent, preventing the need for all judges to fly a possibly substantial distance to take the world course. In New Zealand, continental courses are occasionally held in Auckland, however it is more usual for New Zealand judges to attend the Australian continental course.

A major difficulty for New Zealand is establishing how well gymnasts compare in terms of international standard. NZG aims to only send gymnasts overseas if they are of sufficient standard, but determining whether gymnasts are of sufficient standard is enormously complex. In theory, it should be a simple matter for gymnasts to be judged in New Zealand and their resulting scores compared with those achieved in international competitions. However, there are too many anti-programmes at work by the judges in New Zealand to make this a viable system.

As judges in New Zealand are registered and aligned with a particular club, judges may be motivated to inflate the scores of gymnasts from their club in order that they can represent New Zealand, or deflate the scores of gymnasts from rival clubs. Judges may also have personal beliefs or preferences for which gymnasts should be representing New Zealand. Finally, there could be an agenda set by NZG or the code's technical committee who want particular gymnasts to score marks high enough for them to attend international competitions.

The difference between the scores that gymnasts may receive in international competitions compared with what they may be awarded in New Zealand is discussed by Stuart, who speculated on the scores achieved by one gymnast in the USA and how comparable these were to those received in a New Zealand trial on the previous weekend:

(Gymnast) went to USA last year and got some good scores there. But that could have been (because) they only had 2 judges on the panel, not 5 or 6 or whatever so they

wouldn't have picked up on everything. And with the new rules just being implemented all the rules would have been slightly different to what they are now. He got a good score, he scored 85 whereas last weekend he scored 82, but then last weekend he had quite a few falls and in the US he was clean. (Stuart)

An aerobics competitor, Alison, described that her scores varied between countries owing to the differing emphasis on artistry:

If it's a European comp, our artistic scores are a lot lower. The European way is disgusting. The way we know aerobics on this side of the world is about performance. (Alison)

Therefore even if competitors compete overseas, it can be difficult to know whether the ranking they received at that competition will be the same as at another competition. Predicting the scores gymnasts will achieve at overseas competitions seems to be a highly difficult task, particularly as the scores which competitors achieve within New Zealand may be different again.

The different agendas at work in New Zealand were hugely apparent at a 2007 trial for an overseas competition. The gymnasts needed to achieve a score of 11 in order to qualify to represent New Zealand, and after the first routines the scores were only around 5 – 8. However, the New Zealand code committee were highly hopeful that these gymnasts would and should qualify. Consequently the Head Judge concluded that the judges were judging far too harshly and requested that they be more lenient. During this trial, I happened to have volunteered to help with results, and was sitting at the laptop, entering the scores into the computer programme as they came through from the judges. During a break, the Head Judge approached me and asked if I could please use the computer programme to tell her what individual judges' scores the gymnasts would need to achieve in order to be awarded a score of 11. I duly did as requested, and the Head Judge spent the remainder of the trial calculating how to increase her own scores, and which other judges needed to do the same, in order to ensure the gymnasts qualified. The gymnasts consequently qualified, but one of the execution judges told me that in accordance with the Head Judge's wishes, she had had to ignore half the errors the gymnasts were making in order to make her scores high enough for the gymnasts to qualify. After two more months work and presumably improvement over that time, the gymnasts only achieved scores of 7 – 10 during their overseas competition. This suggested that the original scores awarded by the judges in the trial were indeed 'correct' with the 11s the gymnasts were awarded at the trial being overly generous.

This incident was not an unusual one. Parents, coaches, judges and administrators are often extremely motivated to ensure that gymnasts are allowed to represent New Zealand regardless of how badly they perform at the international competition. This sets up a conflict between these groups and those from the national organising bodies such as NZG, NZOC and SPARC. These national organisations are determined that only gymnasts of high calibre should be permitted to represent New Zealand as they operate on limited budgets and must be seen to be accountable to the New Zealand tax payer. As such, they ask the code committees to set high qualification marks to be achieved at trials in New Zealand. However, because the scores in these trials are sometimes dubious, as in the example above, ensuring only high level gymnasts are permitted to travel seems extremely difficult.

The following section examines the way the FIG and NZG have reconfigured the judging process through the addition of further actants of extra humans, a video camera and a “synchro machine” in order to ensure accurate judging. It is possible that for ensuring accurate scores at trials, similar solutions could be adopted. For example, a technology such as Skype offers the potential for a video camera to be combined with humans everywhere in the world, so it is possible such a technology could be implemented to ensure that trials within New Zealand are overseen by judges from other nations who have no agenda about which New Zealand gymnasts are chosen to represent the country. In 2009, the NZOC announced that in order to ensure that the scores at any New Zealand trials for the 2010 Commonwealth Games were accurate, they were considering videoing the routines and posting them overseas to be checked by overseas judges.

Solving Unreliability: Adding More Humans

In New Zealand, in order to ensure that judging is as fair and correct as possible, extra humans are introduced to double and triple check the scores awarded. In all codes, the scores for that apparatus are collected by the Head Judge for that apparatus and checked over. Being human however, head judges vary immensely in their thoroughness of this task. While some head judges will stop the proceedings in order to confer with judges, others will barely look at the scores.

A further check is undertaken by the Judging Director. The Judging Director is a high level judge, either Level 3 or Brevet, who has been elected or appointed to the national committee for that code to specifically oversee judging. The Judging Director is provided with all the scores from all the judges at every reasonable sized competition within the country in order

that they can check through each judge's scores and check for any errors. For example, the Judging Director may observe through examining a year's worth of scores that a single judge is particularly generous while judging her own club but harder when judging other gymnasts. If they find any discrepancies, they are empowered to speak to the relevant judge, or remove them from judging panels as they see fit. In one case, the Judging Director disallowed a particular judge to judge at the National Championships as a result of analysing her previous marks and deciding she was not of sufficient standard. But being human, the Judging Director is not infallible. The Judging Director could also be biased, or lack the time to explore the scores sufficiently, or not consider the discrepancies great enough act upon. Therefore this system is not entirely reliable.

At international competitions, there is also some degree of checking over the judges' work. Vanessa, a trampolining judge, described how in a competition in Canada, she experienced the Head Judge removing two judges who lacked the competence to judge properly and appeared to be copying her scores:

I could see the superior judge watching them and I was thinking "oh God, what's going on". At the end of the round she pulled me aside and she said to me "I don't have an issue with your judging but I'm just letting you know that I have an issue with the judges around you". And she let me know. She said "just keep going" so we got up the next round and carried on and then they were taken off the panels! (Vanessa)

Neil, a trampolining coach and judge, further described how the FIG policed judges by publishing reports of inadequate judging: "There was a published list of judges in Holland that got a reprimand for inconsistent judging. So they certainly weren't shy in dragging them over the coals."

Alyssa described how at international competitions for women's gymnastics, all scores are not only checked by the Head Judge for that apparatus, but by the Apparatus Supervisor as well:

I can't release them, as a Head Judge, until the Apparatus Supervisor has said ok... they've got to make sure the score is consistent with what it should be. So if the scores come out and they're all in range, we have to put it through but the Apparatus Supervisors have some leeway with saying that's incorrect in comparison with their previous score. (Alyssa)

In addition to being signed off by the Apparatus Supervisor and the Head Judge, scores are also checked by the Jury, which is made up of three members of the FIG Technical Committee for that code. Alyssa described how when she was judging at the 1999 World Championships, the Jury directly intervened to change a score:

It did happen in Tianjin once, when Prudonova did a double front vault. And all the judging panel said that she didn't fall, that her butt didn't touch the floor, but the jury did. So they changed it. In slow motion her leotard brushed the floor. In men that would be a 0.1 deduction but in women that was 0.5 so her scores were actually changed. So she never did it again, which was a shame. (Alyssa)

In this statement, Alyssa speaks with disappointment at the outcome of the Jury's interference, as Prudonova's performance of this particular vault was tremendously exciting for many gymnastics fans and it was very disappointing for them that she performed it only at this one major competition. Presumably from Prudonova's point of view, the score she received was too low to motivate her to continue performing this vault any longer.

At both the National and International level, the checking mechanisms are becoming ever more complex through the addition of more and more humans to try to ensure fair judging. An increasingly complicated hierarchy has been formed to oversee the judging process. From the point of view of the FIG, or NZG, they initiate a programme involving enrolling more humans, to counter the anti-programmes such as bias, perceived national loyalty or incompetence. However, as these human actants remain fallible, a more reliable non-human actant has been introduced: the video camera.

Solving Unreliability: Introducing the Video Camera

Internationally, improvements in technology and the close sponsorship of the Swiss company Longines led to an attempted solution to the problem of judging inaccuracies or bias. As a first, at the 2005 World Championships, a video replay system developed by Longines, known as IRCOS (Instant Reply and Control System), was used for judging men's and women's artistic gymnastics. It simply allowed the judge in charge of judging difficulty to replay the routine, or parts of the routine, to confirm exactly which movements the gymnast made. Alyssa, a New Zealand gymnastics judge who had used the system while judging at several international competitions, described:

It's quite a big screen, obviously. You have two screens; over here you get a list of the competitors, so you can click on the competitor to bring up the screen. And then you

get, well, it's like a DVD player, you can go forwards, backwards, slow motion, whatever you want to do, it will do first 6 second session, second 6 session, etc. Especially in bar, you don't want to watch the whole minute routine so you hit the last 6 seconds or the first 6 seconds because you want to obviously see a turn. So you can choose whereabouts. It's quite easy to use. Then you obviously get the replay here. Then here you get the judges scores.

Here's a drawing:

| | | |
|---------------------|--------|------------------------------|
| List of competitors | Scores | Video or "screen" of gymnast |
| Time frame bar | | |

Fig. 7.2 A drawing of the IRCOS screen by Alyssa. (Personal communication)

The difficulty judges can use the "time frame bar" to move forward and backward to choose the part of the routine they wish to watch.

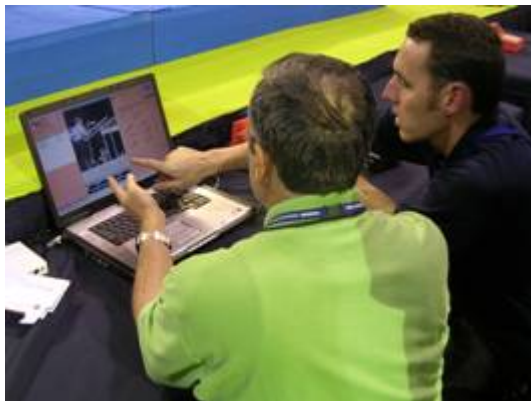


Fig. 7.3 Judges watching a video on IRCOS at the 2005 World Championships. FIG (2005). Retrieved from www.fig-gymnastics.com

Difficulty is the area of gymnastics where objective evaluation is a possibility. When judging difficulty, the judge is determining whether the gymnast performed a skill or not. As in ice skating, it is "a matter of checkable empirical fact whether skaters performed the required jumps and do so without falling or stumbling" (Dixon, 2003, p. 105). In gymnastics, each

skill has very particular guidelines describing whether it has been performed correctly. For example, on rings any holds must be held for between one and three seconds to be counted. Thus, whether a gymnast performed this is easily confirmable through watching a video and timing the hold. Yet as described in the previous section, human judges can be unreliable and make errors.

By contrast, technology is assumed to be more accurate than a human. For example, in a swimming race a stopwatch is far more reliable than a human in determining who wins. A human cannot always see the difference in time if two athletes touch the wall at close to the same time, by contrast a stopwatch can be relied upon to do so. The assumed reliability of technology led to the International Gymnastics Federation greeting IRCOS with enormous enthusiasm. The new video system was expected to have the ability to solve the mistake that occurred in the Olympic Games in 2004 where the wrong gymnast received the gold medal owing to a judging error⁵². It allows the difficulty judges the chance to check that they have made correct judgements and it allows coaches to protest and use the video as evidence of perceived incorrect judgements. After each routine, the difficulty judges are able to immediately view either parts or the whole of the routine again on a laptop to confirm they have made the correct judgement. If a coach or gymnast disagrees with their difficulty score, they can issue a protest and the routine will be reviewed by other judges to ensure the mark is 'correct'.

Despite the assumed advantages of the video, concerns have been voiced that relying on technology can be dangerous as machines lack the capacity to explain (McFee, 2004, p. 102). For example, if a stopwatch malfunctions and shows a time that does not seem correct, it is not possible for the stopwatch to explain why it gave that particular time. This is where the system introduced in gymnastics is particularly effective. It is neither a human nor a machine, but a hybrid of the two (Latour, 1991). In this way, accountability is provided in the sense that there is an inscription created in the form of a video which allows the routine to be circulated amongst other judges. As a result, the score can be checked and confirmed yet explanations can still be provided. However, in order for this to occur, the judge must enrol the technology; the video must become an assemblage with the judge. Interviews with judges revealed that there was variation between how often judges made use of the replay system. Stuart, a judge

⁵² Paul Hamm received the individual all around gold medal which should have gone to Yang Tae Young from Korea. The FIG and IOC investigated the situation and discovered that three judges had accepted bribe money and consequently marked Yang down. These three judges were banned for life for judging at any further gymnastics competitions. Paul Hamm was asked by the FIG to return his gold medal in the spirit of fairness but he declined to do so (Grandi, 2004).

of men's gymnastics, described how in his experience of using the system at international competitions, it was often enrolled:

Roslyn: So how often did they use it at Worlds?

Stuart: Quite a bit I suppose.

Roslyn: Every routine, every 10th routine?

Stuart: In rings, if you don't hold a skill for a second it doesn't count, if you hold it for a second it does count. So, if it's not going to be counted, they'd probably look at it then. If it's between 1 and 2 seconds, they won't look at it because they can see it's counted, that's their job. And generally if you say it's "1001" (counting) they'll give it credit without looking at the video. But if it's really short, that's where they'll look at the video to get the proof... And probably looked it 20 – 30% at the time. At a guess.

Stuart's description suggests the men's judges perceived the system to be a useful tool and enrolled it regularly. They perceived the camera/judge assemblage to be definitely useful in particular situations. He believed it assisted with ensuring accurate judgements. Alyssa's comments, from women's gymnastics, were quite different:

Alyssa: I didn't use it to make any judgements at all. But we used it on vault to confirm a decision we'd made... both times we were right.

Roslyn: So it wasn't used that often?

Alyssa: No. They used it a few times on bars just to check the completion of something... And I don't know if they used it at all on beam... But on floor we used it later to confirm what we thought.

Alyssa described how the system was only enrolled occasionally to confirm a judgement they had already made, however she was clear in saying that she did not require the system and that she was capable of doing her job without the system. Unlike Stuart, Alyssa did not suggest the assemblage was particularly worthwhile. Susannah, a trampolining judge, was even more certain in her belief that the system was not necessary:

... they tend to go to the video only if there is a protest; if you have to go to the video it is like saying you aren't competent enough to do it yourself the first time which is a matter of great pride amongst diff (icuity) judges and you risk getting a bad report - usually its best to take the best guess and hope no one notices! (Susannah)

In trampolining, Susannah suggests the system is deliberately not enrolled. The trampolining judges have created an anti-programme because they are very attached to seeing themselves, and not a technological device, as the ultimate arbitrators. Thus, the camera has not been a solution to solving the problem of accuracy at all, even though technically, the camera/judge has that ability.

Solving Unreliability: Introducing the “Synchro Machine”

Synchronised trampolining involves two trampolinists bouncing on two parallel trampolines. The trampolinists are judged not only on the difficulty and execution they perform, as in individual trampolining, but on how well the two trampolinists are synchronised. The goal is for the two trampolinists to perform every single movement at exactly the same time. As a result, the judging panel for synchronised trampolining includes not only difficulty and execution judges, but “synchro” judges who solely judge the synchronisation of the routine.

The judging of synchronisation is surprisingly difficult. As Vanessa, a trampolining coach and judge described, it is impossible for our eyes to completely focus on two bodies at the same time:

...you actually gaze, you can't look. You have to gaze. You can't focus because you're looking across. If you look at one particular trick, how can you do synchro? You've got to look across and gaze and that's why when I run a synchro course I try and do that.
(Vanessa)

She added that it is particularly difficult when the two competitors are “travelling: if one's down one end and one's down the other”. She refers here to the common mistake of when the trampolinists do not stay in the middle of the trampoline, bouncing instead at one end, and in synchronised trampolining it can be at opposite ends, making it even more challenging to watch both trampolinists at the same time.

Apart from the difficulty of watching two bodies at the same time, a decision also needs to be made about what dictates good or bad synchronisation. For example, if two trampolinists are unsynchronised, determining the exact point when this lack of synchronisation takes place can be crucial for deciding the score. There appears to be some disagreement between judges as to which part of the movement is the most important to be synchronised.

Vanessa described how for her, she watches how much of each body is unsynchronised, with the routine being terminated⁵³ if the bodies are different by half a body length. She described: “It sort of goes 1 (points to ankle), 2 (points to calf), 3, (points to knee), 4 (points to thigh) 5, (points to waist)” meaning that once the synchronisation gets to 5, meaning 0.5, then the routine is terminated. Terminated means that although the athletes may continue bouncing, the routine is judged out of only the movements they managed to complete before this point.

In contrast to Vanessa, Neil, also a trampolining judge and coach, described how he uses the point of contact with the trampoline to determine synchronisation:

... it all comes down to the point of contact with the bed, not what they're actually doing. If you can actually determine one person is going up and the other is going down, then technically they're doing different skills at the same time. So in effect your leeway is your contact with the bed. It's that split second of going up and down on the trampoline. Technically if someone's going down, they haven't hit the bed yet or going up just after they've hit the bed coming the other way, that's when I would determine that the routine is terminated. (Neil)

Neil's concept of the timing of hitting the trampolining bed being a method for determining synchronisation led the FIG to create a specialised “synchro machine” purely for judging synchronisation. Neil described that it consists of “a beam of light under a trampoline and a timing regulator” that is able to record at what point each of the trampolinists hit the trampoline bed, producing numerical results that can be interpreted into a score for synchronisation. Like the video camera included for judging difficulty, the “synchro machine” was added to the network to judge synchronised trampolining in order to create a more accurate and reliable outcome.

However, Neil described that for reasons he did not understand, the “synchro machine” had proved to be highly unreliable, so much so that at international competitions where it was used, human judges were also employed:

The rumour or theory behind the synchro machine has been around for 20 years, I mean, they first started talking about it in the 80s. And periodically it's come up, we've seen it, but it's never been relied upon. They had it in Holland (World Championships 2005), but they had synchro judges as well so that what they would do is that the

⁵³ In synchronised trampolining, the judges stop judging and the routine is terminated if the trampolinists become too “out of synch”.

synchro judges would have a mark for every routine and if electronically the thing fell over itself half way through a round, they would use the synchro judges' scores. But if the thing went right through then they'd use those scores. As long as it was a complete round either way... if it were so easy and so reliable then there'd be no need for the synchro judges as back up. (Neil)

In synchronised trampolining, although a piece of technology was introduced into the network to improve a highly challenging competition to judge, it was found to be far less than reliable than hoped. At the 2005 World Trampolining Championships which Neil refers to, this resulted in human judges being enrolled in addition to the technology as the technology was proving highly unreliable. Therefore, although in this case the technology was designed to replace the human judge, it proved impossible. Instead, a hybrid of both the machine and the judges was used.

Conclusion

This chapter has described the complex labour of judging gymnastics. Through following the actants from the local to the FIG, an elaborate hierarchy is revealed to have developed which has grown in response to the many claims from judges, coaches, gymnasts and gymnastics fans about how the system could be improved.

Just as the chapter on video technology in training revealed how not all coaches and athletes enrolled video technology despite their general agreement regarding its potential effectiveness, this chapter similarly found that judges are equally varied in choosing to enrol the video camera. Although the men's judges were described as doing so with enthusiasm, the women's and trampolining judges revealed that they were somewhat reluctant to enrol it fully.

Through examining 'who enrolls what' in this way, an aspect of the power structure of judging gymnastics is revealed. Although it is easy to assume that the FIG has the final say in determining how judging operates, following the enrolment reveals that both the judges and the technology are empowered to prevent enrolment. Judges described only making minimal use of the video system, and the synchronised judging technology for trampolining was found to prevent full enrolment through breaking down. Similarly, the mentions of gymnasts protesting scores and asking that judges' review their work on the video suggests that gymnasts are also empowered to question the judges as the final arbitrators. Further, several incidents were described where the FIG or the judging jury interfered and either changed the

judges' scores or removed them from judging altogether. Therefore power is shared, and constantly moves between key actants in the judging process including the FIG, judges, gymnasts and non-human technologies.

The crucial nature of the non-human technologies was also revealed through examining the exact judging process and how judging knowledge is circulated. The judging process at an individual competition is mediated entirely by non-humans. Actants such as slips of paper, orange boxes and computers not only have the power to affect the score, but are crucial to a score existing at all. Without these actants, different parts of the score only exist in the heads of individual judges and therefore could not be calculated into a final score or ranking. When examining how judging knowledge is circulated, it was found that any knowledge that was not inscribed in the Code of Points proved problematic for all judges and coaches to obtain. Incriptions, in the form of documents that can be rapidly circulated by the internet, allow new knowledge to be circulated and learnt. Without these inscriptions, judges have difficulty in obtaining information, although it was found that different New Zealand judges have developed particular strategies for obtaining this information.

The need for the inscription of the Code of Points to circulate rapidly was also found to be significant owing to the enormity of the changes to the Code that occur regularly. Judges, coaches and athletes need to constantly keep up to date with the changes to the rules, and the inclusion of the internet and an FIG website in the network of judging facilitates this process. However, this chapter revealed how the inscription in the Code was insufficient, with judges developing alternative methods such as creating friendships with overseas judges, in order to keep up to date with new information.

Chapter 8

The Networks of a World Champion

2004 I was World Champion... It was like wow, I'm the best in the world! I think the most exciting thing was I held that title for two years. It was like no one in the world's better than me for two whole years. (Angela McMillan, aerobics athlete)

This thesis has so far examined a number of factors that are influential in the production of elite gymnastics in New Zealand. The preceding chapters focused on selection, training, the implementation of technologies, the enrolment of scientists and on judging, and how these areas work to create elite gymnastics. This chapter shifts the emphasis to examine the ultimate goal of elite gymnastics: the production of success. Although definitions of success in gymnastics vary, there is no disagreement that the achievements of aerobics athlete Angela McMillan, in winning the World Championships in 2004 and remaining in the top five in the world for the last five years, very strongly constitute success. This chapter begins by examining the difficulty of identifying success, then notes some of the commonly held explanations for success. It then moves to examine the ordering of aerobics and how Angela has utilised this ordering to create success. While many of the ideas already discussed in this thesis are shown to be relevant to Angela's success, in particular training and the use of video replays, Angela's experiences also introduce several other factors as significant. These include the organisational structure leaving aerobics less professionalised and the configuration of aerobics as arguably 'easier' than the other codes and more appropriate for older athletes.

What is Success?

While it may be assumed that the goal for any athlete is to win competitions, athletes vary extensively in their definitions of success. Sporting bodies such as the NZOC and SPARC require evidence of success in order to select athletes to receive funding grants, sports science support services and for events such as Commonwealth and Olympic Games. However, producing appropriate evidence of success can be surprisingly difficult given the lack of agreement about what kind of success should be recognised and rewarded in New Zealand.

Throughout 2008, GSNZ (2008) attempted to start defining success by creating three categories of high performance athletes, based on the model described by SPARC. These

work to rank athletes into a hierarchical order. High Performance athletes were defined as any athletes proven to be in the top 16 in the world. This was considered the highest level of success. The next level, Performance level athletes, were defined as those in the top 50% of the world and considered only semi-successful. The third category was Talent Identified athletes who were defined as those with the potential to become Performance or High Performance level athletes in the near future (GSNZ, 2008). The third category is the most contentious, as described in chapter three, and generally includes the physical testing of athletes as part of its criteria. It aims to select athletes based on their future ability to represent New Zealand, while the categories of High Performance and Performance athletes are based on actual results achieved.

The creation of these categories is significant for gymnastics as there are particular advantages in being identified as part of one of these three groups. The most useful advantage is the potential access to funding, through SPARC, sponsorship and through charitable gaming trusts. Athletes have found it is far easier to gain financial support from all sources if they can produce a piece of paper saying they have been identified as being part of one of these three groups. A piece of paper of this nature acts as an inscription which can be circulated to demonstrate or prove a gymnast's ranking.

Chapter three highlighted the difficulty of creating a fair selection process for representing New Zealand at international competitions. Similarly, chapter seven described the problematic nature of ensuring athletes competing in competitions within New Zealand receive fair and comparable marks with those achieved at international competitions. With these difficulties in mind, a possible solution appears to be to use the results achieved by athletes when competing overseas to ascertain the level of their success. However, this can also be problematic.

In any international competition in gymnastics, there are a large number of variables. Components such as the number of athletes present, the standard of the competing athletes, the standard of the judges and the location of the competition can all have a large impact on the meaning of the places attained. In several cases, New Zealand athletes have appeared to perform well until these components are considered. For example, in 2007, New Zealand's Mikhail Koudinov finished in 8th place on floor exercise at the Shanghai World Cup. This sounds an exciting and highly impressive achievement, suggesting that Mikhail was amongst the top eight in the world on that apparatus. This result had large implications for Mikhail, as it ensured he was defined as a "Performance" level athlete and applied for and received grant funding. However, other members of the gymnastics community argued that the Shanghai

World Cup competition did not have very many of the world's top gymnasts present. Therefore, although Mikhail's success meant that he could produce a piece of paper for the NZOC and SPARC suggesting he was in the top eight in the world, those with detailed gymnastics knowledge of who was present at the competition were aware that he was less successful than that result made him appear. Although the goal of using international competition results is to provide a way to translate the standard of the gymnast into a worldwide ranking, the translation process was not smooth for this particular competition.

Given that competitions such as World Cups occur several times throughout the year in gymnastics, it is not that unusual that they do not include all the top gymnasts in every competition. By contrast, it is assumed that the World Championships will include the top gymnasts in the world and therefore the results from this competition are highly reliable. Yet even here, results can be difficult to compare. For example, the New Zealand Rhythmic Group finished in 21st place at the 2005 World Championships, which does not sound far off the top 16 finish required by GSNZ to define a gymnast as High Performance. However, at these World Championships, only 21 groups entered and so New Zealand essentially finished last. Similarly, as World Championships exist as the qualification event for the Olympic Games, any World Championships during the year preceding the Olympics tend to include a larger number of competitors than any others. For example, it was far easier to achieve a high ranking at the 2005 World Championships in any code in comparison with the 2007 World Championships.

The host country also plays a part in influencing the placings of athletes. Typically, the country hosting any competition benefits in being able to enter a larger number of athletes, and often these athletes appear to receive scores that are perceived as generous. For example, at the 2006 Aerobics World Championships, the media suggested that the Chinese athletes attending the Championships received higher marks than usual as the competition was held in China (Anon, 2006). As a result of perceptions like this one, where a competition is held can influence whether coaches wish to send their athletes. For example, in rhythmic gymnastics, in discussing potential competitions to attend for athletes' trialling for the 2010 Commonwealth Games, several coaches agreed that New Zealand athletes were more likely to receive higher scores in a competition held in Canada than Australia. It was felt that Australia would be likely to have a high number of Australian judges at the competition in their country, and these judges would be hard on the New Zealanders as the two countries are very close in competition and historically, New Zealanders have not received high scores in Australia.

However, these results are simple to work out in comparison with the difficulty in determining whether junior-age athletes are successful. In artistic and rhythmic gymnastics, there are no World Championship level competitions for athletes below the Senior International or Open level. This makes it extremely difficult to gauge the standard of our athletes compared to others in the world because there are such a huge number of different competitions they could attend all of which will have different athletes attending of greatly varying standards.

By contrast, trampolining and aerobics hold junior age-group events, the World Age Games, which are the equivalent of world championship events for these younger age groups. In trampolining, athletes can compete in 10 – 12, 13 – 14, 15 – 16 or 17+⁵⁴ age groups. In aerobics, they compete in 12 – 14 and 15 – 17 age groups. At these events, athletes can be crowned ‘World Champion’ for their age group. Using the GSNZ’s high performance criteria, it therefore should follow that athletes who receive medals in these age groups are ‘Talent Identified’ as presumably they have the future potential to reach Performance or High Performance level at the Senior International level. However, this is not the case. New Zealand has won numerous medals over the last decade in trampolining in the age groups, yet not had an athlete finish in the top 16 in the Senior category. This suggests, as agreed in the literature on talent identification (Abbott and Collins, 2002, 2004; Scott 2004) that success at the junior level is not an indication of success at the senior level.

Further, this system disadvantages athletes born every second year as the World Age Games have historically occurred every two years⁵⁵. Therefore a thirteen year old must compete against fourteen year olds, which is very significant at this age where a single year can make a huge difference both in amount of growth and training.

Another factor in all competitions at all age groups including Senior that can hugely affect the marks and placings awarded is the exact year, and how much change has occurred to the Code of Points at this point. As noted earlier, the Code of Points is updated following every Olympic Games, and consequently the year immediately following the Olympics, scores are highly variable as judges try to learn the new rules. For example, in rhythmic gymnastics there were huge changes to the Code following the 2008 Olympic Games, which led to some highly inconsistent scores being awarded in different competitions in 2009. One New Zealand

⁵⁴ Although age 17 officially denotes a Senior International athlete, in trampolining, the rules allow gymnasts to compete for 2 years in grade 17+ if they wish before moving to Senior.

⁵⁵ Although, in another example of the instability of the sport, this appears to be changing. In 2010, World Age Games are scheduled as occurring despite them also occurring in 2009.

gymnast competed in Malaysia in April 2009 and was awarded a total of 77, yet in New Zealand never received a score higher than 70 despite improving enormously throughout the year.

Despite these difficulties, there is one athlete competing in one of the gymnastic codes who has irrefutably and unarguably attained success by any possible criteria regardless of all possible variables. In 2004, Angela McMillan from New Zealand won the Women's Individual title in the Aerobics World Championships. In 2006, she finished 5th, and in 2008, medalled again, taking bronze. No other athlete in any other code has reached the top 20 at World Championships throughout this period, emphasising the enormous difference between Angela's success and that in the other codes. While this chapter begins by describing some of the common explanations for success, the main body of this chapter examines the network of aerobics and how its particular configuration has led to Angela's success, in contrast with the other codes. Some of this discussion is based on Angela's own explanations for her success⁵⁶, which are also echoed by other athletes and coaches in the country.

Explanations for Success

Research examining high performance success often frames success as resulting from the presence of a very small number of factors. Green and Oakley (2001, p. 252) describe these as: "the identification of human resources (athletes); methods of coaching and training; efficiency of the sport organisation; and the depth of knowledge of sports medicine and sports science". In the case of New Zealand, Collins (2008) similarly describes how the important factors are talent identification, coaching, sports science and medicine, competition opportunities and emergence of full time athletes, and facilities. These factors are essentially "black boxed" (Kaghan and Bowker, 2001) as processes which produce a particular outcome defined as success.

While previous chapters of this thesis have examined some of these black boxes, participants in gymnastics often mooted their own "black boxed" explanations for success that were different to those described above. One such "black box" which was commonly discussed by coaches was 'New Zealand culture'. Many athletes and coaches voiced the rhetoric that New Zealand culture was not conducive to success. For example, many of the foreign born coaches in all codes who have moved to New Zealand commented on the gymnasts being less

⁵⁶ Angela McMillan is the only participant in this research who is referred to by name, and agreed to allow this.

disciplined than in other countries. One such coach described the New Zealand children compared to those in other countries as lazy:

They're really really lazy. Not very competitive. This is general, not all athletes. They're competitive only with how they do compared to other people, not with themselves. And they're really nice kids, most of them, really nice, friendly and helpful and generally in a good mood more than in (other country) where they'd get frustrated and pissed off. Here they just go "oh, I dropped my ribbon, hmm" whereas in (other country) they'd be crying and bawling their eyes out and I'd be saying "keep going, keep going" But they're fine, people cry at every practice. Back home, everyone cries at every practice and here it's (name) and that's it. Maybe they don't care. Or maybe it's just because they're going to ballet and they're going to soccer and they're focused on so many things. It's very weird. But definitely very lazy and not as disciplined. (Meg)

This sentiment is echoed by other coaches and gymnasts. Corina, a rhythmic gymnast argued that other countries were more successful because of the way they were coached: "And their routines are absolutely amazing because they work, they are pushed to the limit. Whereas in New Zealand, parents wouldn't like to see their kids pushed like that." Here, Corina argues New Zealand parents draw on the discourse described in chapter two, of gymnastics training being too hard and intense. As Turmel (2008) points out, in most Western societies, the role of children is orientated around playing and learning, rather than working. The number of hours required in gymnastics training and the intensity of the training provided is often considered by New Zealanders to resemble work rather than play, and therefore is not viewed as acceptable for children.

Several foreign born coaches agreed that they like living in New Zealand because they perceive life here to be easy and pleasant, but that it is exactly these qualities that are counter-productive to the hard work required to be successful. One coach described how she expected that gymnasts she had taught from a young age would develop a strong work ethic from being trained by her from a young age, but instead she found as they grew up they developed lazy habits. Another coach described how he tried to include a large proportion of non-New Zealand born children into his classes because he had found that children from cultures which he believed prize hard work, such as China or Russia, worked harder and were therefore more successful. However, a different coach argued that although these children often achieve by New Zealand standards, their achievements are far less than they would be if they were training in their home country and surrounded by others with a similar work ethic.

Angela McMillan echoed the sentiment that the New Zealand culture is counter-productive in producing international standard athletes. She argued:

...it's the culture in New Zealand. It's not the fact that the athletes are not good enough or it's not a gymnastic country, it's the culture that we have is wrong. Not wrong, but for gymnastics, if you're talking gymnastic gymnastics, the kids are not mentally strong enough. Even the parents, I was speaking to (another coach) this morning and she said the same thing, the kids have it far too easy. The parents baby them and they have life far too easy... We're not mentally tough, we're not a country to stand up and say we're good at something and if someone does then people around them think they're arrogant and full of themselves and all the rest of it. (Angela)

Angela argues that life in New Zealand is very easy, particularly for children with devoted parents. She argues that the easiness of their lives prevents children from becoming sufficiently tough to achieve highly. Angela went on to describe how New Zealanders do not celebrate and support their high achievers:

New Zealanders don't support champions at all unless they stay there. Even with rugby, even when we win, everyone is like, yeah well they won't stay there, you hear people saying yeah they've won once. And I've always said I was never going to win once, I was going to win twice. That kind of hasn't happened. You hear people say can they stay there, look how many times Sarah Ulmer had to win a medal before New Zealand respected her, and now she was on the verge of retiring then McDonalds came in with all this stuff. She should have had that a long time before. New Zealand does not support their sports, especially their minor sports. Not even their major sports, they don't back them. Of course the All Blacks lose because the country is not behind them. They say they are and everyone goes away 'oh yes we're all proud to be New Zealanders', but think the New Zealand culture holds our athletes back a lot. (Angela)

In this quote, Angela describes a version of "tall poppy syndrome". Kirkwood (2007, p. 366) defines tall poppy syndrome as the "cutting down" of high achievers and describes it as having a long association with New Zealand culture. Angela argues that this attitude prevents New Zealand athletes from achieving highly. Liam, an artistic coach, agreed:

Since I've been in New Zealand, they have a very tall poppy syndrome as well and they don't like kids doing well and I always say to the kids, especially the younger ones: I want you to say you did well. (Liam)

Liam went on to describe the view that athletes need to be highly determined to succeed:

You've got to be quite selfish because if you're not selfish you're not going to want personal glory. You've got to be extremely driven to not allow any external pressures, family, friends, to get in the way of their dream. And you've got to have that dream...Some people are driven by I hate to lose I love to win. For me, that gave me my drive, no one would ever put anything in the way of me getting my goal. Other people it might be a slight social aspect, being part of the team environment. Other people it might be learning big tricks. Other people it might be the travel. (Liam)

In this quote, Liam refers to the idea that athletes have to be highly driven in order to succeed, another commonly stated explanation for success. Dyer (2006, p. 343) describes the same focus by the successful New Zealand America's Cup teams, who were focused both on winning, and on the process that would result in winning: "making the boat go faster". He defines this focus as a "culture of excellence" and argues that it is necessary to achieve international success (Dyer, 2006, p. 343). Abbott and Collins (2004) similarly argue that the goal setting ability is one of the most significant determinants in discriminating between medal winners and non-medal winners. They argue that psychological factors like goal setting are particularly crucial for athletes to perform well for a consistently long period of time. The emphasis on the importance of psychological factors and determination is in opposition to the focus on the body as the crucial determinant as described in chapter three. Angela echoed this discourse by describing her single minded focus on the goal of becoming World Champion as significant.

By contrast, no other gymnast described a specific goal they were working towards. Several gymnasts revealed that their motivations for competing in any of the gymnastic codes were less about winning and more about other factors, as Liam's above quote suggests. For example, a men's gymnast, Damien, described:

I find it very challenging. Especially during those younger, sort of teenage years I really really loved the competing and I loved the training, learning new things. Probably as I'm older I enjoy the training less. There's probably other driving things like I want to go to Commonwealth Games and I have a scholarship which pays for my university – things like that. (Damien)

Damien here describes a dual focus of attending, rather than winning, at Commonwealth Games, and continuing to hold a scholarship that pays for his university education. Barbara, a trampolinist, described how for her, her motivation was very much about learning new skills rather than achieving or winning:

That's (learning difficult skills) again part of the adrenalin and I love it! Learning new things, sometimes you can just be shaking like crazy then afterwards you're just...like, if you go home and you haven't done it, you're just like deflated. But if you go home you feel good for the rest of the night, I love that feeling. I guess that's part of the reason I stay in the sport. (Barbara)

Esmerelda agreed that in trampolining, learning new skills and having fun were a large part of the motivation for competing:

It's just fun, like, heaps of fun. And I don't know, probably the adrenalin rush. Like, I've taught so many people front flips and when they land on their feet it is the biggest thing in the whole world. It IS the biggest thing. (Esmerelda)

In rhythmic gymnastics, participants were keen to discuss that their sport had unique qualities that made it particularly attractive in comparison to the other codes. For example, Kelly, a coach argued: "Gymnasts who come to rhythmic often love to dance, often love ballet, are often quite 'girly' in terms of liking to dress up with the difference in leotards to other gymnastics codes". She argued that it is the ballet movements and the fancy costumes that particularly attract the gymnasts. Barbie, a 17 year old gymnast expressed the view that one of the things she loved about the sport was: "And the glitter!! I like the glitter." Others suggest that it is as much the creative, expressive, balletic nature of the sport that makes it attractive. Tricia, a coach, commented: "I think the girls that do it like the dance aspects, they like the feminine side of it. I think a lot of the girls really like the music aspect of it. It's more working with music, with every routine". Karry, a gymnast, agreed that the dance component is very important: "I think people are attracted to the beauty of the sport. Because it's quite elegant and balletic. I like it because it's balletic".

Interestingly, although coaches tended to use language that defined the sport as feminine, the gymnasts themselves never referred to their enjoyment in this way. For example, in the above quotes, coach Kelly used the word "girly" and Tricia "feminine" in describing the what the gymnasts' liked about the sport, yet gymnast Barbie used "glitter" as her reason and Karry "balletic". These gymnasts move beyond the label of "feminine" in attempting to be quite

detailed about what exact parts of the sport are attractive to them. For example, Corina, a gymnast who began as artistic and made a deliberate decision to move to rhythmic, was keen to emphasise the difference in the style of movement required in rhythmic versus artistic gymnastics:

I think rhythmic is more creative, while artistic is more, I don't know the word, rhythmic is more, you flow with music, whereas they're sort of more, not static, they're more stiff movements whereas rhythmic flows on. (Corina)

By contrast, Bridget wanted to distance herself entirely from the conception of the sport as “feminine” and instead emphasised the competitive aspect of the sport:

I'm not very interested in the leotards and make up but it's rhythmic gym and I've been brought up with it...I know lots of girls in sports are. What drives me is you see all these people doing these amazing things and you want to do it like that and be like that and that's what drives people, well, that's what drives me. (Bridget)

Bridget's motivations could be applied to many different sports, which is understandable given that rhythmic gymnastics was the only sport she had ever participated in. Bridget was identified as talented at age four and had been training at rhythmic gymnastics all her life and said she had never before thought about why she had any interest in the sport.

When speculating on why other gymnasts might like the sport, Bridget also had a difference response to everyone else. She argued that it was the apparatus that was most attractive:

Ribbon is always the thing that everyone always wants to talk about, like, do you do the sport with the ribbons...They want to play with ribbon, ball, hoop. I think the attraction to it is that you can play with all these things. (Bridget)

Bridget's comments have been found to be very accurate from observations of beginner gymnastics classes. Children aged 5 – 10, just starting gymnastics, would often make a beeline for the rhythmic equipment ahead of the artistic apparatus. One administrator remarked that she is always fascinated by how much the boys at these classes enjoy the rhythmic equipment, which she never would have expected before seeing it, as she assumed the sport was too ‘feminine’ for boys to be interested in.

Latour (1995) argues that the participants themselves know what they do and why they are doing it. In rhythmic gymnastics, it is quite clear that the gymnasts themselves have definite

reasons for enjoying their sport that pertain to very distinct parts of the sport, particularly the specific movements and ways of moving. The gymnasts in this case are providing detail, allowing a detailed description and therefore understanding of the sport to be generated (Latour, 2005, p.137). A traditional sociological perspective may argue that this description is insufficient, that there is something missing “since we have not ‘added to it’ something else that is often called an ‘explanation’” (Latour, 2005, p. 137). In this example of rhythmic gymnastics, some of the coaches attempted to add their own explanations for the gymnasts’ motivations by using the framework of femininity. Chapter two described how the framework of femininity has commonly been applied to gymnastics. However, as this example shows, using a framework such as the feminine/masculine means the detail given by participants would be lost. Both the detail of what exact parts of the sport are attractive, and alternative explanations such as the attractions of the apparatus, would not be revealed in this framework. Similarly, this chapter looks beyond black boxed explanations such as “culture” and “motivation” and instead examines the set of arrangements in Angela’s aerobics network that have led to her success. Aerobics is shown to work as a somewhat unique and disorderly network in comparison to the other codes.

Competitive Aerobics

As Brabazon (2000) points out, there is a strong distinction between competitive aerobics performed by serious competitors and the fitness aerobics practised in mainstream gymnasiums. Brabazon (2000) describes the difference between the two as epitomising the binary between elite/sport and participation/fitness. A high level competitive aerobics routine bears only a small resemblance to fitness orientated aerobics. While a competitive routine must include some standard aerobics elements such as jumping jacks, it operates at very high speed with enormously intricate choreography and includes many elements that are more commonly seen in artistic gymnastics routines such as leaps or versions of handstands. The relationship between competitive and non-competitive aerobics is perhaps most succinctly described by a coach who, when asked if there was a relationship between the two, replied: “Are you mental? No way!”

Aerobics is the ‘youngest’ of the five codes competed in New Zealand. While the FIG holds the distinction of being the world’s oldest sporting organisation, affiliated in 1881 (FIG, 1991), and men’s gymnastics is one of the few Olympic sports to have been competed at every Olympic games from 1896, aerobics is a very new sport. The first World Championships for aerobics were held in 1990 after the sport gained popularity in the USA

during the 1980s (ANAC, n.d.). The sport became under the FIG umbrella in 1996 (ANAC, n.d.).

The significance of competing in a ‘new’ sport was discussed by several participants. One aerobics competitor described how the sport had far fewer competitors than artistic gymnastics owing to it being so new. As discussed in detail later in this chapter, this suggests that it is easier to win medals. Trampolining benefits from a similar situation, in also being a young sport and particularly a newcomer to the Olympics, as one trampolining coach argued: “And for us, you can get to worlds quite easily in tramp because as a sport it’s not as old as gymnastics, so we don’t have the old countries doing so well.” For both codes, their lack of history can be seen as very positive in some ways, as these participants describe. Another result of the ‘newness’ and ‘smallness’ is the lack of professionalisation and integration into the New Zealand sport funding system.

Government Funding

Green and Houlihan (2008) describe how several countries, including New Zealand, have adopted a somewhat uncritical stance in assuming that increased government intervention is the pathway to sporting success. They suggest that in some cases signs which suggest increasing government intervention is failing are ignored, with governments instead tending towards the point of view that increasing intervention even further will result in success. In the case of aerobics, Angela’s success confirms Green and Houlihan’s (2008) argument that government intervention is not crucial for success, as her success has occurred with only minimal government support.

Part of the reason Angela has received so little support is due to the positioning of aerobics. Aerobics as a sport is less eligible for funding than the other gymnastic codes. Aerobics is the only FIG code in New Zealand that is not an Olympic or Commonwealth sport. The World Championships remains the pinnacle event for aerobics competitors. This means aerobics athletes are not eligible for funding through the NZOC which all other gymnasts can access.

Aerobics is also a relatively small and minor sport, possibly, as described above, owing to its newness. At the 2008 World Championships, only 35 nations participated. As a result of these circumstances, Angela McMillan receives no funding from SPARC under the 2006 – 2012 High Performance Strategy. This plan states how SPARC will support athletes in sports that matter to New Zealand with particular interest in Olympic events, and also any athletes who are ranked in the top 8 in the world, providing their event includes 75 countries for men or 40

countries for women (SPARC, 2006). With women's aerobics only including 35 countries at the last World Championships, Angela does not qualify for funding.

With the configuration of aerobics preventing her from receiving government funding, Angela needed to find other methods to fund her training and travel to competitions. Not unexpectedly, Angela's parents have provided her with substantial financial support, and Angela has worked as much as her training allowed. However, the configuration of aerobics has also allowed Angela to acquire sponsorship from outside of New Zealand. For a range of reasons that will be discussed throughout this chapter, Angela spends approximately half of every year training in Japan. In contrast to the athletes in other codes, Angela's mobility resembles that of other "returnees" (Maguire, 1996, 1999), who spend much of their time outside their home country but still retain home ties and return home regularly. Angela described how two of the important benefits of having a presence in Japan are the celebrity status and accompanying financial benefits she receives that she cannot in New Zealand:

The support of me in Japan is fantastic. I have more sponsors in Japan, well I don't have any here. I'm sponsored by Gold's gym, their supplement company, Avia. The only shoes I can wear is Avia and they make an actual sport aerobic shoe, and because my feet are so small I can't wear any other type. So I just ring them up and say I'll need shoes, they just chuck me shoes. And because of who I am and I'm in Japan a lot, everywhere I go, everyone knows who I am. In New Zealand, even people in aerobics don't even know who I am. I'm the aerobics world champion, I'm like a superstar when I go there, it's fantastic, they'll pay me just to turn up with my coach, they'll pay for me to go. (Angela)

This is a very different arrangement than in the other codes. In the other gymnastic codes, training outside of New Zealand is perceived to be highly expensive owing to the necessity to pay for accommodation and living costs in addition to training fees which can be more expensive than New Zealand. In aerobics, the reverse occurs for Angela, as the aerobics network includes a country that welcomes Angela and awards her celebrity status. In Japan, Angela receives not only sponsorship, but is paid a form of 'appearance fee' for visiting other gymnasiums and events. While in New Zealand, it is common for World Championship medallists from more prominent sports, such as rowing, to make money in this manner, for Angela the minority status of her own sport means she is only able to do this in another country where the sport has a much more celebrated status. Further, Angela can 'appear' at a range of different events and locations because of the lack of specific apparatus required for

aerobics. There is no requirement for a fully set up, specific purpose facility as there is in some of the other codes.

Facilities

The necessity for high standard facilities has been clearly identified as a major factor in developing elite athletes in a range of countries (Houlihan and Green, 2008). Facilities for some sports in several countries, such as athletics and swimming in Australia, are government funded, providing elite athletes with world class facilities for training, even if these facilities are at times fought over between elite athletes and the general public (Houlihan and Green, 2008). In all the gymnastic codes in New Zealand, facilities are not government funded, but similar to sailing in Australia (Houlihan and Green, 2008), are provided by a strong club culture facilitated indirectly through lottery grant funding. Despite artistic gymnastics having unusually high needs in terms of space for equipment, there are currently four, and soon to be several more, gymnasiums housing the full range of artistic training equipment up to international standards. These have been built directly by the clubs who have raised money through a combination of lottery grants and private and corporate sponsorship. In several cases, trampolining and/or rhythmic gymnastics share these multi million dollar spaces. In other cases, trampolining and rhythmic own or hire private buildings or school halls which have the necessary roof height.

In contrast to all these examples, aerobics is both the best and worst off. Aerobics remains the only gymnastics code without a single international standard competition environment. The only requirement for aerobics is a floor area, yet there is not a single one in New Zealand, as an aerobics coach describes:

The biggest issue in aerobics for New Zealand is the fact that we do not have any competition floors in this country. I've put a floor down in my gym which is the nearest. The top is exactly the same as what they competed on in France, but it's not sprung at this point in time. It will be when I have enough money to put springs underneath it. (Natalie)

However, in comparison to the other codes, aerobics does not specifically require a particular regulation floor as they can potentially train on any wooden floor. Dierdre, an aerobics coach, describes:

They find a 7 x 7 square of wood, a floor. It's a bonus if they've got mirrors...
 Anywhere that they can find a space. I think the kids who are keen will find a space.
 (Dierdre)

Finding a "square of wood" is exactly what most aerobics coaches and/or clubs do in New Zealand. There is only one aerobics club that has a permanent facility within a gymnastics club, the others all train in a variety of spaces, often at 2 – 3 different places in a single week. For example, one of the most successful clubs trains twice a week in the basement of an RSL club with a concrete floor, twice a week on an artistic sprung floor they hire from a gymnastics club, and twice a week in a room with a wooden floor they also hire from a gymnastics club. Although the concrete floor is not ideal, they hire this room because it is much cheaper than hiring the room at the gymnastics club.

Therefore, although aerobics does not have an internationally competitive training facility, the requirements of the aerobics code means that the competitors have a far wider choice of places to train. They are able to be far more mobile in their choice of facility. This contrasts heavily with artistic gymnastics, which requires a huge amount of equipment that usually requires the support of a large club to purchase and maintain. In aerobics, there are no large clubs on the scale of artistic gymnastics in operation in New Zealand.

The Positioning of Clubs

GSNZ aerobics in New Zealand is the smallest of the five codes. While for all other codes, there is a selection process, which is often quite tough, for athletes to attend the national championships, for aerobics there is no such requirement⁵⁷. There are so few competitors in the sport that all are encouraged to attend. Further, while for all other codes the competition lasts over four-to-five days, for aerobics it lasts only two.

One reason for the small size of the code is the lack of support for the code within large clubs. While there are several gymnastics clubs in New Zealand that run at least two of the codes together, there is only one club in the country that competes in aerobics along with other gymnastics codes. One aerobics coach argued that the reason for this is concern from other codes that their gymnasts will leave their own code and choose to participate in aerobics

⁵⁷ In all codes other than aerobics, athletes must pass a set qualification mark. In some grades, particularly in artistic gymnastics, athletes must also be selected as part of a regional team which can be quite difficult. For example, in the region of Canterbury, in levels 4 and 5 there are often up to 80 gymnasts competing for only 8 places in the Canterbury team to compete at the National Championships.

instead: “It would be good to get aerobics in more gym clubs but gym clubs are anti it because they think we’re going to steal their athletes.”

The small size of aerobics has meant that there are no large professional clubs as is the case in other codes, and there are no full time aerobics coaches employed in New Zealand. In all the other codes, there are several full time professional coaches employed by clubs who run the high performance programmes. As described earlier, gymnastics coaches frequently hold coaching or teaching degrees and are experts in coaching their respective codes. By contrast, the role of competitive aerobics coach has not been professionalised (Abbott, 1988). Instead, aerobics coaches only work at coaching part-time and inevitably hold other jobs to supplement or provide the bulk of their income.

The lack of large clubs and full time coaches means a lack of power to bargain for resources at the national level. On one hand this is detrimental for aerobics athletes such as Angela who miss out on receiving direct SPARC funding. On the other hand, some aerobics participants argue that this leaves aerobics the space to develop their code with far less regulation from the national or regional level. As the remainder of this chapter describes, the lack of regulation in aerobics has been influential in allowing Angela to develop a training regime in a far more flexible way than the other codes.

In artistic and rhythmic gymnastics, the pathway to international success has been black-boxed (Kaghan and Bowker, 2001) for a number of years. Kaghan and Bowker (2001) describe how black-boxing involves placing a boundary around a certain set of practices and identifying appropriate inputs and outputs which then become stabilised as producing particular performances. In artistic and rhythmic gymnastics, the production of international standard performances was black-boxed through the process of passing through a talent identification procedure (as outlined in chapter three), then competing in a very specific set of levels/grades and competitions and training for a large number of number of hours per week. This pathway is assumed to produce a successful gymnast. For example, the appropriate pathway in rhythmic gymnastics is for gymnasts to pass the talent identification test, then compete in grades called “stages” before competing in junior and senior international grades, and rhythmic has followed some version of this process for the last approximately fifteen years. By contrast, it was only in 2005 that aerobics created a pathway similar to this. Prior to this, there was no particular pathway outlined by the NSO to progress to the international level.

In Angela's case, this meant that she was able to assemble other connections to create international success. Originally, as a young teenager, Angela was selected by an individual coach who trained her for a number of years and brought Angela to the Senior International level. In contrast with coaches in the other codes, this coach was not employed by any particular club and therefore was 'free' to work with and coach whichever athletes she chose to approach and who wished to work with her. It was a far more flexible and ad-hoc arrangement than is the norm in the other codes, where Angela did not attend organised aerobics classes.

However, this coach retired in 2001 and at that point, Angela and her family had to work out how to progress further. Given the lack of professional aerobics coaches in New Zealand, once this coach retired, Angela felt 'free' to search worldwide for a top coach to work with rather than feeling limited by the resources in New Zealand:

So at the end of 2001 our family talked about it, and (name) my coach, always talked about if you want to be the best you have to train with the best, so I went, who's the world champion, who's their coach and just emailed him and said 'look I want to train'. He said 'yep that's fine'. (Angela)

As this coach resided in Japan, Angela therefore needed to move to Japan in order to train with him. While this sounds simple, it is only the small size and lack of professionalism of coaching in the code of aerobics that allowed this to be possible. In other codes, the world's top coaches are generally employed by NSOs and no athlete from outside that country would be permitted to train with them. For example, in rhythmic gymnastics the top coach in the world, who has coached the Olympic champion in the last three Olympic Games, is Irina Viner of Russia and Russia's NSO heavily protects who is allowed to train with her, even between Russian gymnasts. Similarly in artistic gymnastics, the top coaches in countries such as Romania, China and Australia are all employed by the national governments for the purposes of training their own gymnasts and it would be impossible for a gymnast from a rival country to gain access to those coaches. In many countries, the state model of the government funding Olympic sports means all codes other than aerobics are government funded. The Olympic Games are perceived as one of the most effective stages for nations to develop national esteem and this motivates nations to fund Olympic sports (Maguire, 1999). In aerobics, the small size of the code coupled with it not being an Olympic sport results in the code using a market based as opposed to a state based model. This means aerobics coaches and/or clubs are unable to rely of government funding and exist only through the demands of the market. In being accountable only to their customers, not the government, the

government therefore has no power to influence which athletes the coaches coach. Therefore, coaches like Angela's coach are available to coach athletes from other countries in a way that coaches in the other codes are not.

Another aerobics coach, Donna, argued that the lack of government support as experienced in countries such as those above has caused aerobics athletes to become highly self sufficient and that this has contributed highly to the success of aerobics in New Zealand:

I think it's because we've had absolutely no support and we've had to do it ourselves right from the start. When you're it, there's nobody else, you're either going to do it or you're not. You're going to put 100% in and work your little butt off. But if you've got all this stuff to fall back on and all these support structures, like the nutritionist, the psychologist, the doctors, but we're like, every other sport has a nutritionist, let's go find one, we've had to source that ourselves and build the relationship that way... It's because we had to do it ourselves. We had to get up at six in the morning and train or we lost. (Donna)

Donna assumes the position that the lack of government support and professional coaching has been positive for aerobics and describes how aerobics athletes support themselves through market consumer pathways rather than an official state structure or a professionalised coaching structure. It is interesting that Donna chooses to focus on the scientific structures that are often argued to contribute strongly to international success (see for example, Green and Oakley, 2001) as a reason for lack of success. Instead of arguing that if Angela and/or aerobics had these services they would be able to achieve more, she instead suggests that it is the very lack of these things that have provided a strong motivation to work hard and consequently succeed.

Donna is not alone in describing aerobics as self sufficient. One rhythmic coach, Meg, observed that aerobics training appears to include more self-coaching than the other codes: "Sports aerobics...they seem to train themselves a lot more and they charge separately for choreography". As aerobics lacks a model where coaches are employed by the club or state, the training programme for aerobics can be far more individually tailored than in gymnastics clubs in other codes. In chapter five, several coaches described how they had not time to utilise technology because they were required in their employment contract to coach large squads at all times. In the case of aerobics, the lack of a model that employs full time coaches means that coaches can adopt more individual models of coaching and choose to spend more time coaching one-on-one than a large group.

Another aerobics coach, Dierdre, confirmed how aerobics coaches are often not employed by clubs in the same way as gymnastics coaches are. Instead, the norm is for them to operate much like a piano teacher, where they teach a single athlete for a private lesson and expect the athlete to practise in their own time:

Generally each coach will charge by the hour and they will charge anything, I don't know but I remember them charging \$25 an hour... You get absolutely one on one. Which I think is absolutely fantastic. You work intensely for that hour and then you go away and have to practise in your own time what they have taught you. (Dierdre)

This was borne out by observations of aerobics training. While in all other codes, training sessions primarily took place as group sessions, in aerobics private one-on-one sessions were more common. For example, in one club the aerobics competitors trained three days per week as a group, plus each individual attended at least one, but often several, private one-on-one sessions, usually one hour long, with their coach each week. The coach at this club spent three days per week coaching her athletes as a group, and three days per week coaching private lessons. This was a huge contrast to all the other codes, which were observed to have every session as a group session with only the occasional private lesson as a supplement.

The idea of success being created through a contracted rather than state based model contradicts the notion that the professionalisation of sport is one of the key factors in producing sporting success (Green and Oakley, 2001). However, as Green and Oakley (2001) observe, systems that work well in one country do not necessarily work well in a different environment. Chapter three showed how the system of talent identification, often proclaimed as one of the hallmarks of the rationalisation of sport, was not felt to have contributed to producing high level athletes in New Zealand owing to a range of other variables being equally significant. Similarly, in chapter six, it was found that sports science services as provided by the government did not prove any more useful or effective than personally locating sports science assistance when needed. These chapters, together with Angela's experience, suggest that in New Zealand, a lack of club and coaching structure and government support is not a deterrent to achieving success.

A More Global and Competitive Network

In training outside of New Zealand, Angela's network is extended from being purely New Zealand based to incorporating a larger aerobics network. However, her non-aerobics

connections are far less in Japan. For example, Angela described how she can train far more easily in Japan because her network there does not include family or work or other potential distractions from training:

It's easier to train in Japan because there's no interference, there's nothing to get in my way... there's not one little excuse to take me away from training. But here, my dad will ring up or someone will go Ang can you come into work, any little excuse will get me out of training. (Angela)

In this quote, Angela suggests that the many connections of life that she has in New Zealand draw her away from training. This quote reveals how Angela, as an assemblage, is also a daughter and worker, both of which are potentially unnecessary for creating an effective gymnast-assemblage. In Japan, she is able to exist purely as a gymnast-assemblage without the other networks of her life intruding.

Another significant benefit that Angela receives from being part of an extended Japanese network is a much greater number of competitors to compete against. Many coaches in all codes in New Zealand argue that a detriment to success is the lack of competition at the high performance level caused by the small number of gymnasts enrolled in high performance gymnastics in New Zealand. For example, Meg, a rhythmic coach, focused on the small scale of gymnastics in New Zealand as a factor in the lack of success:

I think part of the problem is that it's very easy to win here. Because when there's only 7 people in your level as compared to 80 at home, or even 100s in Europe, then you better bust your ass. Whereas with 7, you might be able to pull it off and win if you're really talented. And the kids here that are super talented I find are more lazy than the ones who aren't. Because they're like "Yeah, I'm gonna win, I'm a natural" or whatever, I think that's part of it. (Meg)

As Meg describes, there are frequently very few gymnasts in New Zealand competing at the Senior International level. Often there are three or less at each of the Junior and Senior International grades, making a medal at the National Championships a sure thing. Meg's sentiments were echoed by other coaches, particularly those who had only recently immigrated to New Zealand. One coach described how in Russia, to make the Soviet team a gymnast needed to first win the regional championships in her home region where there were hundreds of other good gymnasts, then from there go to the Russian National Championships and finish in the top 24, and from there go to the Soviet Championships and finish in the top

six. She described how one of her gymnasts who was selected for the Soviet team only remained there for one year before her place in team was taken by another up and coming gymnast. Similarly, she described how in the USA there are about 700 gymnasts training in high performance, aiming for the six places in the National team.

In Angela's case, although there are not a large number of athletes competing in the senior elite division in New Zealand, her presence in Japan and at regular overseas competitions means New Zealand competitions become relatively insignificant for her. The regular overseas competitions include a larger number of competitors become the norm, thus escaping the feeling of having very little competition within New Zealand itself.

Access to Competitions

Attendance at regular international competitions is not something all athletes representing New Zealand are able to achieve easily. Collins (2008) describes how in many sports in New Zealand, such as athletics, the difficulty of geographic distance plays out through the international competition schedule clashing with the local competition schedule. This results in New Zealand athletes not being able to attend all the necessary international competitions to develop a strong reputation. In gymnastics, athletes and coaches are equally concerned about New Zealand gymnasts' lack of attendance at important competitions, believing this causes them to be scored poorly when they do compete.

As trampolining coach Neil describes, most of the high level competitions take place in Europe, where gymnasts frequently compete monthly, or sometimes weekly, in high level international events. Living in New Zealand means it is very expensive and time consuming to attend these competitions:

We battle isolation as a country here. If we get to one international competition a year, we're doing well. And even then it's costing the parents 5 or 6 grand to do it. Whereas those kids based in Europe, would probably do one every fortnight. Their exposure to international trampolining is so much greater. Plus the fact that our kids line up and get up on the trampolines and it's oh yeah it's New Zealand, what are they going to fall off on? Whereas if (name) had been based in Europe for 12 months and done all the competitions and been successful, then at the competitions it would be oh it's (name). But how do you base a trampolinist in Europe with a coach? Where is the money coming from for that? So in effect the chances of you getting someone that's in a position to do that not only requires having a child with that particular physical ability,

but mental ability, the coach availability and the parent has to have just won lotto! You start to say what are the chances of this kid coming along and they're not huge.

Whereas you get someone in Germany and half of the factors aren't there. (Neil)

There are several people in New Zealand who agree with Neil and are attempting to put processes in place to create the "based in Europe" situation which mirrors Angela's set up of 'based in Japan'. In 2009, one club employed a coach who could not be based full time in New Zealand and so therefore agreed on a deal where she and some of the New Zealand gymnasts will spend a part of each year training in her hometown in Russia in order to achieve the access to the European competitive scene. The hope is that through training in Russia for 2 – 3 months and competing in European competitions, the gymnasts will become familiar faces to many of the European judges and coaches and therefore raise the international profile and therefore scores of New Zealand athletes.

One coach argued very strongly that it is not only an international presence that New Zealand requires, but New Zealand needs to form relationships with other countries in order to be scored highly at international events:

Well I think the biggest problem in New Zealand is the fact that it's not close enough to the other countries to be able to strike up friendships and alliances, which unfortunately, is really important in rhythmic. I think that's what makes the difference in the standard, not because the standard is not good, but because you don't have the friendships...

Because, you know, England are really good friends with Bulgaria, so when the English girls go over to a competition in Bulgaria, the Bulgarian coaches and judges will push for British girls to get better marks. (Miranda)

This coach assumes that there is a certain level of bias as a standard part of rhythmic judging. In contrast to the methods described by the FIG in the previous chapter of attempting to free the sport from bias, this coach argues that instead, New Zealand should accept that there is this supposed bias and simply develop the relationships to counter it.

Corina, a rhythmic gymnast, expands on Neil's point that New Zealand suffers from the athletes not being known and therefore not having a reputation. She argues that as New Zealand is unknown, they tend not to be scored highly, and that New Zealand could receive higher scores if the judges had seen and judged them before:

...to get the experience to get higher up in the world, you've got to go over and compete with the top. But we're not getting enough people over there, I don't think. Our group should have gone over to Europe and competed in many competitions before worlds so the judges got a feel of who we were. But when we went to worlds, they had no idea about New Zealand, so we were automatically ranked as the bottom. They sort of, if we'd competed more frequently overseas, we'd benefit from seeing other groups and we could improve ourselves, and the judges would get to know us. (Corina)

Corina's point about New Zealand needing to build up a reputation in its own right seems valid in the case of aerobics. In aerobics, New Zealand has some history of success due to the Aitken triplets, who competed as a trio for New Zealand and were ranked in the top five aerobics trios in the world in the late 1990s and early 2000s. It could be argued that the Aitken triplets gave New Zealand a positive reputation that made it easier for Angela McMillan to be taken seriously when she started competing in open competition in 2003. This contrasts strongly with other New Zealand teams. For example, the New Zealand rhythmic group finished last at the 2005 World Championships and second last at the 2007 World Championship. This is argued to have set a low level of expectation for New Zealand as a nation⁵⁸.

To some extent, Angela gets over the hurdle of international exposure by training in Japan, where there are some highly significant competitions for aerobics, and where it is closer and cheaper for her to fly to other parts of the world to compete. However, Angela found it did not always work this way, as at times, the funding she received required her, as a New Zealand athlete, to fly out of New Zealand, not Japan. For example, Angela describes how the month leading up to the 2004 World Championships was very difficult because of the amount of travel she did, and the requirement that she fly out of New Zealand for each individual competition in order to be eligible for funding:

Before I left to go to Bulgaria I was staying in hotels and in 12 days I was in 10 hotels before I went to Bulgaria. Because of the funding, I had one comp in Japan, I was 2nd in that, then I had to go back to NZ, then to Japan, then go to France, compete, come back to NZ, I was 3rd in France, I had 12 days in between that massive flight, went through 10 hotels. (Angela)

⁵⁸ For example, the CEO of GSNZ during 2008 felt so strongly about the negative effects of having New Zealand athletes finish at the bottom of international events that she implemented a rule that New Zealand gymnasts could not represent New Zealand unless they could prove that they would finish in the top 50% of any competition they entered. However, this rule was scrapped in 2009 with the new CEO taking over.

In this quote, Angela also describes her success at other competitions leading up to World Championships, which connect to Corina's point above about the importance of competing internationally prior to large competitions in order to gain an international reputation.

While many sports have various methods of seeding and ranking athletes which set an athlete's reputation, in gymnastics reputation is seen as particularly significant owing to the scoring system assemblage including a human judge who can be influenced by their prior knowledge of the gymnasts. As Findlay and Ste-Marie (2004) found, human judges are, both consciously and unconsciously, influenced by their previous knowledge of gymnasts. Therefore, coaches and gymnasts argue that it is highly important for New Zealand gymnasts to be seen at lesser competitions and develop a reputation for them to be scored highly at higher ranking events.

Access to Expertise

Another similar factor is keeping up to date with international trends. As already described, the rules of gymnastics are constantly being updated, and keeping up to date with these rules and with new coaching techniques can be very difficult.

Angela is able to keep up to date through attending the top competitions and personally seeing what is being performed internationally. Angela also ensures she works with the top coach in the world. When she identified her goal of wanting to become world champion, Angela contacted the current top coach in the world and asked if he could coach her.

Within New Zealand in the other codes, there are a surprising number of coaches who have been hugely successful. Several have coached members of Soviet or other European teams who won medals at World and Olympic events. Also, New Zealand has a history of success in the trampolining discipline of double mini tramp, where historically New Zealand was very dominant. However, many of these coaches have not achieved success in the last decade. For example, one coach described:

But over the years we've had some bloody good success. I've coached 25 world champions. I had a kid that retired that won 8 open international medals. She wasn't a one off. We've had 19 different kids who've won world open and age group titles.
(Neil)

While this coach speaks with authority of having produced a number of world champions, even at the open level, none of these open titles have occurred in the last decade. As all the gymnastic codes are constantly about creating new routines, and constantly updating the rules, it can be very difficult to retain a current knowledge level.

This issue is one where SPARC has directly offered assistance through a number of different programmes and grants designed to enhance the knowledge level of elite coaches (Collins, 2008). The grants most commonly applied for by gymnastics coaches are Prime Minister's Scholarships, which allow coaches to travel overseas and learn about current trends and innovations. SPARC describes a long list of example activities that coaches may apply to do with a Prime Minister's scholarship:

... accreditation requirements, business coaching, mentoring, training, internships, conferences, study visits, observations at key sporting events, discussions on 'best' practice, on-the-job shadowing, participation in peer network activities, participation in international committees or working groups, peer review of professional work, travel, accommodation, incidentals and reimbursement for lost income. (SPARC, 2009, para. 4)

Molly from NZG described one coach who was awarded a Prime Minister's Scholarship:

She's had funds available to her to go overseas and study in overseas countries and work alongside national coaches, bring that knowledge back, not only for her own programme but to share it with coaches in New Zealand. (Molly)

A coach who was awarded a Prime Minister's scholarship described how useful she found it to travel to observe one of the top coaches in the world who had recently coached an Olympic medallist:

It was good because he would spend time with me in the breaks saying "what do you want to ask about this? This is the philosophy behind it, this is what we do. This is everything else about it." (Amy)

Many coaches have found these scholarships extremely useful for their own learning, however others complain that the coaches who receive the scholarships do not disseminate what they have learnt overseas. There are differing views on how this should take place. Some coaches who have received scholarships argue that they are willing to disseminate the

information, however they claim that none of the other coaches are interested in learning from them. One described offering to take a seminar to teach other coaches, and no other coaches were interested in attending. Those who are not awarded scholarships argue that they do not have the time or funds to attend a seminar and instead, travelling coaches should disseminate notes from their time away. Further, there is of course argument about who should receive the scholarship, and dissatisfaction that the same coaches often receive them. As such, the Prime Minister's Scholarship operates as yet another controversy in the gymnastic codes.

Training Arrangements

One of the most important areas of expertise is how to organise training. As described in chapter four, the different codes vary in their training arrangements owing to the equipment used and their requirements. One difference that is argued by coaches to be very significant in influencing success is how 'easy' each code is. Aerobics and trampolining are perceived to be much 'easier' codes than artistic and rhythmic gymnastics owing partly to the set in up both aerobics and trampolining that allow competitors to compete in only a single apparatus. This means that in these codes, the training hours tend to be much less. For example, Angela herself describes training approximately 25 hours per week, which is less than the far less successful artistic gymnasts in New Zealand, who describe training around 32 hours per week.

A trampolining coach, Neil, argued that he feels trampolining has a greater chance of success because it appears to be more enjoyable and requires less training hours in comparison with artistic or rhythmic gymnastics:

So what you're seeing is some of these gymnastic parents and kids, they're looking at the trampoline side and not only are they saying that looks fun, it looks like a more enjoyable type of sport to be part of, but also the expectations from an hourly basis during the week and a commitment basis, is a lot less. It's more realistic... I get kids that will come to me and say "I want to go and do such and such" or "I can't train on Saturdays because I want to play soccer" and I'll say "oh well let's see if we can work round it". I don't have a problem with it at all. In fact I encourage them to go play it. Whereas on the gym side, they will turn around and say no you're not doing anything else. (Neil)

Neil acknowledges that trampolining generally requires less training hours. In requiring only a single apparatus, both trampolining and aerobics are framed as easier than the other codes, as Amy, a trampolining coach, describes:

A lot (of gymnasts), that have been to gym before, do tramp because they see it as the easier option, and it is. I have no qualms in saying that it is the easier option. There's less equipment. There's really one, that's it. So you can spend, I don't know, how many pieces of equipment are there in gym? 6? So you can spend a quarter of the time and get as good, and so you don't have to spend the hours and hours and hours that they do. Well, you can't really break it down to quarters because of conditioning but, it's a lot less. And you don't have to have the, the reason gymnastics has been around for a million years and started as one of the first sports is because it showed all round athleticism. Whereas tramp, you don't have to be strong in every single facet of your whole body like you do in gymnastics. You can get away with being less flexible and things like that. It's better if you are, but, it's easier. So we get gym kids that come because it's easier. (Amy)

Amy observes that it is easier not only in terms of requiring the mastery of only one single apparatus, but because the demands on the body are much less. Participants in aerobics similarly acknowledge it is 'easier' than artistic and rhythmic gymnastics. Natalie, an aerobics coach, described how she had a number of aerobics competitors who had moved to her from artistic gymnastics due to the perceived 'easiness' of aerobics and the difficult demands on the body in gymnastics:

There's quite a lot of crossover because they don't tend to stay in gym. A lot of kids don't stay in gym too long because it's just too hard....What I mean by hard is it's just difficult to achieve. Gym gets kids to do extremely difficult skills at a very young age... when you're asking 9 year olds to be doing double backs, it's very hard. And let's face it, we might have 3 or 4% of the population that's actually capable... Training wise they (the aerobics competitors) don't do the hours at a young age that the gymnasts do... they're not doing 30 – 40 hours per week like the gymnasts. And the training's not as hard. You're only doing one routine. Well you're doing floor, you don't have to do all the disciplines. You might have an individual and a trio routine. (Natalie)

An administrator involved in a club with all codes agreed that the training hours required in aerobics and trampolining are at the lower end of the scale while artistic is at the highest end:

We have a couple of (trampolining) athletes that regularly make national teams who only train about 3.5 – 4.5 hours per week. Compared to 30 in artistic. And at that level they go to World Championships and representative teams and things like that... I think a lot of the kids that do rhythmic, sports aerobics, trampoline, tumbling do other things as well. Whereas in the high performance artistic – nothing else! That's a cultural thing as well. Artistic is definitely at the extreme where basically they don't do anything else except train. Whereas even with rhythmic, with the one high performance athlete we've got, she's in the gym 18 hours per week, which is 10-12 hours less. And then on to that she would add 3-4 hours of ballet, but still, it gives her a bit more free time. (Tricia)

Harriett, a gymnast who first competed in artistic and moved to aerobics commented that with only one routine, there's a lot less to work on in aerobics than gymnastics:

“The training, so much more training in gymnastics, there's a lot more to work on in gymnastics, whereas aerobics is just one routine and that's all you work on.”

Similarly, Barbara, a trampolinist, described the training hours as one of the reasons she moved from artistic gymnastics to trampolining: “(in artistic gymnastics) I was doing 16-17 hours per week and they wanted me to move up to 20 or 20+ and I just didn't want to do that.”

While the fewer apparatus in aerobics and trampolining are strong arguments for why these sports are easier, another consideration is whether a sport is in the Olympic Games. Amy, a trampolining coach, argued that becoming an Olympic sport has forced trampolining to improve. Athletes, coaches and NSOs are highly motivated by the possibility of attending the Olympic Games, but the improvement process is taking time to develop: “We're all asleep. We don't know what high performance is, we're too young a sport and we haven't been an Olympic sport long enough to appreciate what it takes to be best in the world.” Amy and other trampoline coaches observed how more children had started taking trampolining with the goal of making it to the Olympics. The inclusion of trampolining into the Olympic Games has raised the profile of the sport and attracted a larger number of competitors, therefore making it much harder to achieve.

Joining the Olympics has led to the creation of an elaborate selection process, more complicated than for any other competition. There are a number of ways that gymnasts can obtain a place in the Olympics. Firstly, they can finish within the top number of gymnasts, which is different for each code, at the World Championships in the preceding year. Secondly, in artistic gymnastics, they could be a member of a team which finishes in the top

12 in the world at the previous year's world championships. Finally, they can be allocated a wildcard, which in New Zealand is only likely to be awarded if no gymnasts from the Australasian region qualify through the other methods and there are no other Australasian gymnasts who finished higher than the New Zealander at the preceding year's World Championships. While obtaining a wildcard is viewed as the easiest method, the two perceived barriers to this are that SPARC is rumoured to have made a decision that New Zealand will not accept wildcards offered to New Zealanders, and secondly, finishing ahead of Australia is perceived to be extremely difficult.

Aerobics, in not being included in either the Olympic or Commonwealth networks, means it lacks these complicated arrangements in order for athletes to compete overseas. Aerobics athletes, like Angela, only need to meet the requirements set by GSNZ and never have to be signed off by the NZOC as with the other codes.

Age

Just as aerobics and trampolining share similar requirements in terms of training hours, another aspect that these codes share is the older age of successful athletes. Aerobics coach Natalie described in aerobics: "Your world champions - they're older than your artistic gymnasts for sure. You're talking mid-20s for female, late 20s for the males." Administrator Tricia points out how the age variance between codes plays out by comparing the age the various athletes begin. She describes how beginner artistic gymnasts tend to be very young, perhaps 5 – 6, while in aerobics, beginner competitors are often high school age:

The sports aerobics are more, well, they're coming in and starting at entry level as high school students. As opposed to something like artistic when you've got them in at 5-6 year olds and working their way through. (Tricia)

This is confirmed when examining Angela's career. Angela became World Champion when she was 24 years of age. She started training seriously when she was around 14 years of age, an age that Tricia describes as normal to begin in aerobics. By contrast, in women's gymnastics a 14 year old would most likely have already been training seriously for around eight years. As described in chapters two and three, in women's gymnastics there is a strong belief that in order to be successful, artistic gymnasts must train intensively at a young age so that they learn most of their skills before reaching puberty.

Another component of the young age is working around school. As gymnasts are usually under the age of eighteen, they are required to attend school, which makes intensive training very difficult. In New Zealand, schooling hours are set quite rigidly, which Tricia argues is not always the case in other countries that offer more flexibility:

...in some of the Asian countries and European countries, the school hours make a big difference. So if they do morning school or afternoon school, it allows them to be a bit more flexible with training. And some of them, I think you see more sports schools in other countries that you do here. We trained in Canada one time after a competition and their girls trained from 6 – 11am, then went to school and did that in the afternoon.
(Tricia)

Tricia's description here reveals how in different countries, the assemblage of the school child is configured in different ways. Similarly, Michelle, a rhythmic gymnast, described how when she talked to gymnasts from other countries at a World Cup competition, they were amazed to hear that she attended school from 9 – 3 every day. However, Tricia acknowledges that some schools in New Zealand do attempt to allow the gymnasts some flexibility with regard to their training:

The schools allow some of the kids to come late after morning training. I think that's fairly common around the country. The ones that do morning training, they usually go 6:30 – 8:30am and then the arrangement is they miss their form time or whatever and arrive in time for their first class. Then the local high school, which about 5 of the high performance athletes happen to go to at (suburb), happens to finish early on a Wednesday afternoon, they don't stop for lunch and finish at 1 or 2. That's just part of the school's set up. (Tricia)

One coach, who happened to also be a teacher, created an arrangement with her athletes where they took correspondence classes supervised by her as well as training. The athletes would simply spend from 9 – 5 at the gymnasium each day, where the day would be split into periods of study and training. In order to qualify for schooling by correspondence, the athletes had to already be selected into a New Zealand team:

To be part of the correspondence school to get free tuition you have to be in a New Zealand team. So that's the limiting factor that I don't have to put on it, it's quite nice. So people have come to me and said can my kid be part of this, and I've said, well, no. Because in order to get free schooling, to get the papers sent to them, they have to be

this. So there's an expectation within what we do of being a high performance trampolinist which means being able to train that much. (Amy)

Athletes who attended the school described above were perceived by many coaches and athletes in New Zealand to have the most ideal set up for attending both school and training. However, athletes older than 18 do not have the requirement of attending school. Though they may attend university, they often do so part time and the classes do not always take up from 9 – 3 every day as school does, allowing the athletes time to train and even work. Further, athletes of university age become eligible to receive a variety of scholarships, such as university specific sport scholarships or SPARC funded Prime Minister's scholarships, which make paying for training easier than compared with younger athletes who must rely on their parents to cover their training costs.

Technologies

As discussed in chapter five, in all the gymnasiums visited for this research, there were very few examples of video technology being used on a daily basis. Although almost every coach interviewed described using video at some point, there was only the occasional use of it within regular training sessions, and almost no daily use. The one exception to this was Angela McMillan's club. At this club, every single athlete would bring their own video camera and set it up on a tripod at the front of the room to video the whole training session. The training session would take place with numerous cameras on tripods sitting at the front of the room. The athletes were reprimanded if they forgot their camera or tripod, and were told to watch the video at home to review their work after every session.

For Angela, the video proved a crucial tool for her to maintain contact with coaches and expertise while she was travelling. She described how she would video her training and email it to her coaches, who would email back with comments. For her particular training situation, where when travelling she does not always have a coach with her, the video was crucial to her acquiring feedback on her performance.

Aerobics competitors also described how during international competitions, the aerobics culture includes 'backstage' videoing as standard practice. A unique aspect of aerobics is the amount of cheering, screaming and clapping that accompanies an aerobics competition. The noise is so loud that aerobics judges often wear ear plugs during long competitions. As aerobics competitors generally perform on a stage, facing the judges and the audience, there is often a great deal of cheering from backstage, from teammates and coaches, to hype up the

competitors. Along with this cheering is the attempt by all competitors to video all others. One aerobics coach described an international competition where any gaps in the curtains to the sides of the stage would have several video cameras held there, one on top of the other. The organisers of the competition would constantly come and tell them to stop videoing as it was not allowed, but the competitors would simply turn the cameras back on once the organiser walked away. In every other code, there is no stage-like situation where this would be possible. In trampolining and artistic gymnastics, the competitors are highly visible at all times and could not possibly video each other without being easily seen. In rhythmic gymnastics, the other competitors are generally behind some sort of screen and removed entirely from the main competition venue. In general in aerobics, both at competitions and in training, the video camera appears to be a more standard part of the assemblage than in the other codes.

Conclusion

Angela's success can be explained through describing a vast assemblage including a huge number of different actants. In following the network of aerobics, it was found to be quite different from the other codes in being less structured and less club-based. The newness and smallness of the sport and its exclusion from the Olympic Games has meant that aerobics athletes have been less likely to receive funding, but also resulted in aerobics coaches commonly being self-employed, giving both athletes and coaches far more freedom in their training arrangements. This arrangement allowed Angela to circumvent national boundaries and create her own international connections which meant she could enrol a coach of her choice who was also free to coach her. In training outside of New Zealand with this coach, Angela therefore overcomes some of the problems caused by New Zealand's geographical isolation such as the lack of competition and lack of expertise.

Interestingly, one part of the assemblage that Angela never mentioned as influential in her success was her physical talent; therefore it is interesting that, as described in chapter three, a physical ability test has been used in New Zealand for identifying talented aerobics athletes.

From the difference in Angela's experience in comparison with the other codes, it may appear to be an easy solution for other codes to attempt to adopt some of the practices that Angela has used in order to become successful. However, as Latour (1991) argues, once any part of an assemblage changes, other actants react to the change and cause a different branch of the network to form which then affects the outcome. In the case of the gymnastic codes, as the apparatus, rules and organisational set ups vary so greatly, so too will the assemblages that

result in success. Each code must instead create their own assemblages that work for their particular code, and also acknowledge that these are constantly in flux as the rules develop.

Chapter 9

Conclusion

This thesis is composed of complex accounts of attempts to secure the stabilisation of the sport of gymnastics. The ultimate and desired stability is the creation of a network that results in international success. Historically, there have been times when various nations or clubs have achieved what appear to be stable networks which result in a continual stream of Olympic and World Champions. For example, the Russian Federation's rhythmic gymnastics programme appears to currently be a highly stable and successful network, being unbeaten at the 2000, 2004 and 2008 Olympic Games. In New Zealand, the most successful network is Angela's McMillan's, as described in chapter eight, which includes a heterogeneous range of local and international actants, from shoes, to a Brazilian coach living in Japan to an intense determination to succeed. All the networks followed in this thesis involve a continual process of enrolling, un-enrolling, translating and mediating, with power constantly shifting and being shared between various heterogeneous actants. This thesis shows how at times these networks stabilise with particular actants being enrolled, such as the judging set up at any single competition which stabilises as a particular assemblage of some form of judge-person, calculator, paper and/or computer for a score to be produced. At other times, the path of the network comes to an end as a particular assemblage or actant is no longer enrolled. Sometimes, as in the case of the rhythmic gymnastics DAP test which was suspended in 2006 and re-established in 2009, the path may be continued after a break of years. In others, such as the example of some gymnastics coaches un-enrolling biomechanists, the path is almost, although never completely, destroyed (Star, 1991). At each step in the gymnasts' progression, this thesis found different and varied forms of enrolment and translation and it paid equal attention to the impact of human and non-human actants in the creation of high performance gymnastics in New Zealand.

Gymnastics as Socio-Technical

The use of ANT in examining gymnastics in New Zealand emphasises the significance of non-humans in producing the gymnast. This is easiest to see through examining the way the gymnast only exists as a gymnast through working as an assemblage with the apparatus, however, it is widely apparent in a number of situations. In chapter seven, the process of judging was examined, and although it may be assumed that judging is primarily the process of a human judge awarding a score to another human competitor, instead it was shown that

the process of judging includes a number of mediators between the score being chosen by the judge and the score being awarded. The score is entered into a computer, and combined with other scores to create a total, where the mediator of the computer or other devices, such as “orange box” or pieces of paper, can influence the accuracy of the score as strongly as the human judges. Traditionally, analyses of judging have focused exclusively on the individual human as a judge and their single translation of the score (see for example Ansorge and Sheer, 1988; Dixon, 2003; Ružena, 2000, Findlay and Ste-Marie, 2004; O’Brien, 1991, Ste-Marie et. al., 2001). However, this thesis emphasises how the score cannot exist without a computer, paper or scoreboard to make the score mobile. Without these non-human actants, scores only exist as numbers in the individual judges’ heads and are meaningless.

Similarly, the need for inscriptions that allow the circulation of knowledge was found to be crucial to the workings of the sport. Chapter three emphasised how the PAT/DAP test needed to be circulated as an inscription in order for coaches to mobilise gymnasts to take the test. Chapter four showed how the Code of Points needed to exist as an inscription circulated through the FIG website in order for all gymnasts, coaches and judges to receive the relevant information about the rules and be able to produce gymnastics routines.

Introna (2009) emphasises that not only do non-humans act, but that particularly in today’s world, we are increasingly connected to technologies to the point where we cannot separate ourselves from the technologies around us. The connection and reliance on technologies was certainly evident in many aspects of the sport. In examining gymnastics training, a range of technologies were found to be crucial to the creation of gymnastics, some of which acted as substitutes for a coach, others which mediated the connection between the gymnast and apparatus. New technologies such as YouTube and the FIG website were also found to be becoming increasingly significant as methods that both circulate the sport and allow New Zealand athletes and coaches to stay abreast of overseas developments. At both training and competitions, the operational network involved a combination of humans and technologies, both of which were shown to be crucial to the production of gymnastics.

One point of contention with ANT is whether humans and non-humans act symmetrically (Collins and Yearley, 1992; McLean and Hassard, 2004). Collins and Yearley (1992) argue that ANT tends too much towards technological determinism in overstating the significance of non-humans as actants. Yet as this thesis shows, in the case of gymnastics, things can act very strongly and a symmetrical approach shows how humans are required to work together with a variety of non-humans. As described in chapter four, the breaking of a handguard, a waterlogged ribbon or an un-bouncy floor can have as much impact on the outcome of a

gymnast's performance as the human gymnast's actions. Things that may seem highly insignificant, such as a ribbon being blown the wrong way by air conditioning, result in the same deductions as bent legs or unpointed toes. Further, the score a gymnast receives in a competition is dependent as much upon the action of non-humans as humans.

Elder-Vass (2008) argues that because people have emergent properties, they cannot be treated as equal to non-humans. But this is perhaps missing one of the crucial points of ANT in that Elder-Vass continues to treat people and things as separate, when the very essence of ANT is the argument that things and people cannot be separated (Introna, 2009; Latour, 2005; Law, 1992; MacLean and Hassard, 2004). The numerous ways that gymnasts and coaches make use of mediators to assemble with the apparatus makes it clear that it is impossible to separate the gymnast-as-human from the assemblage that makes up the gymnast. The handguard, despite its lack of thinking ability, nonetheless acts as a crucial part in the creation of an artistic gymnastics routine and cannot be discounted as any less significant than any other 'human' factor such as the psychological state of the gymnast. Similarly, individual bodily muscles, or physical abilities, act as significant parts of the assemblage that also act yet are not conscious entities.

The physical properties of the equipment are also revealed to be highly important in influencing whether a particular new technology is enrolled. In the case of the video camera being introduced into trampolining and rhythmic gymnastics, the physical properties of the trampoline and the rhythmic gymnastics floor were as significant in influencing enrolment as the attitudes of the coaches. Both factors were considered equally important in the video system stabilising as part of the trampolining assemblage, and not being enrolled in the rhythmic assemblage.

Similarly, the physical properties of the equipment were found to influence the configuration of both training and competition requirements. For example, time limits were found to exist for those apparatus which the human body can work on without eventually tiring, but not on apparatus like uneven bars or rings where it is difficult to remain on the apparatus for any length of time. Also, class sizes and times were limited by the equipment. For example, the physical shape of the trampoline is such that trampolining is only effective if only one person is on the trampoline at a time. Therefore even if a gymnasium manager wishes to timetable 10 children in a trampoline class for purposes of profit, it is impossible to do this if there is only one trampoline.

Recent research in the sociology of sport has been interested in examining the relationship of athletes with technology (eg Butryn, 2003; Butryn and Masucci, 2009; Chapman, 1997; Cole, 1993, 1998; Miah, 2004; Shogan, 1999; Wesely, 2001). This research differs from the perspective adopted here as this thesis perceives the athlete to be always technologised. This thesis shows how the gymnast cannot exist without the technologies of the equipment, that there would be no gymnast, and no gymnastics, without the assembling of the body with the equipment. Yet despite this difference in perspective, there is some similarity in the kinds of accounts created. The athletes interviewed in this thesis commonly spoke of their relationship with the technologies and equipment they used in the same way as the athletes in, for example, Butryn's (2003) study. Several athletes described the methods they used to assemble with pieces of equipment, such as Malcolm who discussed how he pushes harder if he has to compete on a harder floor than he is used to or Barbie describing how she enrolls a hair straightener to iron her ribbon prior to performing. These are very similar accounts to those described by Butryn (2003).

Symmetry

Along with treating humans and non-humans as equal actants in the creation of gymnastics, the question also arises of whether to treat all human actants equally. McLean and Hassard (2004) note a critique of ANT is the study of "heroes" or central powerful figures, owing to the perception that they are important and powerful and therefore will have a greater influence on the network. In gymnastics, it is perhaps unusual that so much literature has been devoted to athletes who fail (see for example Johns and Johns, 2000; Ryan, 1995; Tofler et al., 1996) with only very little attention apart from biographies to the successes or "heroes". In this thesis, chapters three to seven de-emphasise the question of overall success and failure while chapter eight exists as what Law (1991) would describe as the study of a "hero". As Law (1991) points out however, not only do the studies of heroes yield interesting results because of the large and heterogeneous nature of their network-assemblage, an ANT perspective is not actually interested in the 'great person' but rather in the workings that make up the success of that person. Chapter eight examines precisely the workings that have led to Angela McMillan's success.

In chapters three to seven, it is very often that the voices of the coaches dominate the debates. The coaches' voices are significant because, as described in chapter four, they are so crucial to the creation of the gymnastics assemblage. Coaches are not only present at the training sessions and competitions along with the gymnast assemblages, they are also the dominant members of committees like the technical committees in New Zealand who make the

decisions about running the sport. Coaches also often hold more than one role, also acting as administrators and judges. As a key aspect of ANT is the seeking out of informed and competent participants, it is not surprising that a great many of these participants were coaches and in being so informed, that their voices were so dominant.

Macro and Micro

A fundamental yet controversial aspect of ANT is the rejection of any boundary between the macro and the micro (Latour, 1995, 1999; Law, 1992). Several authors who have examined gymnastics or high performance sport have tended to work within this divide (see, for example, Green and Oakley, 2001; Slack and Parent, 2006; Safai 2007). For example, Green and Oakley's (2001) figural piece on high performance sports systems is a macro analysis of the diffusion of Eastern Bloc methods outwards to the Western world. In this thesis, the detail of the Eastern Bloc diffusion becomes apparent from the way GSNZ/SPARC adopt some of the practices of the Eastern bloc, such as partially funding sport science support, and through the migration of Eastern Bloc coaches into New Zealand. Through describing what is traditionally termed the "micro", it is revealed that athletes do not always utilise the funding support provided, suggesting that GSNZ/SPARC and national bodies have less power to affect this change than studies like Green and Oakley's (2001) suggest. Examining how networks were actually assembled also shows how the macro change of globalisation through the migration of Eastern bloc coaches is occurring, but this thesis shows how cultural attitudes are translated by coaches and athletes that result in varied effects and not simply a direct increase in standard as may be expected.

Similarly, in chapter two, the definition of gymnastics, in particular women's artistic gymnastics, as a sport rife with child abuse has framed gymnastics as a sport where the coaches and/or parents have the power to control/abuse the gymnasts. A "top down" power structure is assumed by these authors (see, for example, Blue, 1988; Donnelly, 1993; Ryan, 1995; Tofler et. al., 1997). A very specific example of assuming a particular structure is the work of Johns and Johns (2000) who examine rhythmic gymnasts with specific emphasis on how the judges and coaches use the discourse of "thin is good" to insist upon the gymnasts' subjugation.

This thesis reveals that the power structure in gymnastics is continually shifting. Following who is responsible for enrolling or translating various actants into the assemblage reveals

where the power lies. Power is constituted through the process of interressment¹ (Callon, 1986; Star, 1991). There were several examples of gymnasts enrolling different coaches, including coaches not residing in New Zealand, moving clubs or enrolling additional sports scientists for assistance that suggest that there are potential ways for gymnasts to become empowered in New Zealand. Also, as this thesis found, the discourse of gymnastics as potentially abusive has been adopted as part of the assemblage of the sport and therefore holds power of its own, such as through clubs adopting particular arrangements as part of their assemblage to make the coaches and athletes safer. As described in chapter three, in reaction to the fear of “burning out” and becoming rife with injuries that Ryan (1995) and Tofler et. al. (1996) warn against, one club does not allow children to be selected for high performance programmes before the age of seven, while others have policies that ensure that all training is publicly visible to all parents. In the case of the “thin is good” discourse that was of such interest to Johns and Johns (2000) the strength of this discourse was revealed as so great that coaches appeared fearful of commenting on a gymnast’s weight. As described in chapter six, coaches instead tended to translate this discourse into suggesting healthy eating habits for their gymnasts and encouraging them to attend sessions with nutritionists. Examining the sport as made up of continually shifting assemblages reveals where the power resides through revealing who and what enrolls who and what.

In chapter six, power was found to continually shift between coaches, parents, gymnasts, sport scientists and the government. Parents and the government were found to have the power to enrol sports scientists based on them including money as part of their assemblages which they could impart to the scientists in order to enrol them. However, gymnasts, parents and coaches were found to have the power to reject enrolling scientists if they perceived the scientists to be of little use. Similarly, in chapter seven, it was found that although the FIG has the power to enrol a new video device into the judging assemblage, they were reliant on the judges enrolling the video system as they judged in order for it to be effective, which did not always take place.

Despite numerous ANT studies showing how following the chains of translation reveals the connections between the macro and micro (see for example, Callon, 1986; Latour, 1988, 1995, 1996; Law, 1992), critics still question this position. Elder-Vass (2008) argues that social structure cannot be entirely rejected, as there are stable sections of society that have remained stable for many years. On the surface, this appears entirely correct in gymnastics. As D’Amico’s (2000) study emphasised, it appears there is a macro structure, in the form of

¹ See Chapter Six for a thorough discussion of the interressment process.

organisational bodies such as the FIG, GSNZ and the NZOC who make organisational decisions and are quite separate from the micro workings of what occurs within the gymnasium between the gymnasts and coaches. This macro structure appears to work through the FIG, a stable organisation, directing the national body, another stable organisation. However, when examined closely, the constant change of who and what is enrolled, in how they translate the rules and how they translate their own role, mean that although the overall process appears to work a particular way, when examined closely, it is far more complicated and continually shifting. For example, the selection of gymnasts into teams appears to be a stable process in New Zealand where the NZOC are responsible for selecting Commonwealth and Olympic teams and this appears a stable structure that has remained this way for many years. Yet, as chapter three shows, there are countless actants that manipulate and affect the way the team is structured. As the chain is followed, it is revealed that various actants choose to interpret rules and requirements in different ways which affect the outcome. This thesis found that coaches choose which gymnasts to put forward for selection, parents choose whether they want their children there or perhaps the lack of money as part of the assemblage prevents them from enrolling them in high performance sport. There are numerous inconstant, fluid actants that influence this decision making process. Although the NZOC holds the power of the final say, following the chains of translation reveals many processes that influence the final selection.

Following the network in this way reveals how the gymnast does not come into being until all these many processes have taken place. Mol (2002) examined the disease lower limb atherosclerosis and observed that the disease manifests itself in a variety of ways and locations, such as pain in the lower leg through to as a particular formation of blood cells under a microscope. Mol (2002) argues that far from these being different perspectives of the same phenomena, each manifestation creates a different material reality all of which is atherosclerosis. It is these practices that create the thing that is atherosclerosis; atherosclerosis never exists until it is enacted in one of these practices. By contrast, Elder-Vass (2008) argues that the disease did exist, it had just not been identified yet. In the case of the gymnast, the New Zealand representative gymnast literally does not exist until a range of processes have occurred. Although the gymnast may exist as a being equal to the standard of a New Zealand representative gymnast, they do not become one until this process takes place. As described in chapter four, they must go through a distinct training process to create a body that can assemble with the apparatus. As described in chapter three, they must go through a complicated selection process before being able to trial to represent New Zealand which involves the athlete, parents, coaches and almost always a gymnastic club, then must perform to the desired standard at the trial, and finally be selected by GSNZ or the NZOC.

The Description as Explanation

In line with one of the fundamental arguments of ANT, this thesis primarily consisted of mere description (Latour 1995, Law 1992). It described a number of facets of the sport of gymnastics which allowed an understanding of the workings of the sport to be built up without adding a separate interpretation or explanation. For example, in chapter five, the description of what happened when a new video system was introduced into a gymnastics training centre allowed the explanation to be revealed for why it was enrolled in trampolining and not rhythmic gymnastics. It was found that not only did the coaches have the power to decide how it was enrolled and therefore enrolled it differently, but the physical properties of the equipment and the age and experience of the athletes also impacted on the enrolment. The physical properties of the trampoline, in allowing only one trampolinist at a time to work on it, meant that trampolines naturally had 'down time' which the rhythmic gymnasts did not, which allowed them the time to watch themselves on the video system. Earlier in the chapter, it was revealed that coaches typically coach relatively large groups of athletes because the New Zealand gymnastics network does not include government funding, meaning gymnastics clubs cannot afford to have coaches working with only small numbers of gymnasts or else they could not financially survive.

Chapter four described the training regime by high performance gymnasts. Barker Ruchti (2006) used a Foucauldian perspective to interpret the choices of exercises and set up of the gymnasium as disciplinary measures. Through following the network and describing, this thesis found that the choice of exercises was made based on how each coach interpreted the Code of Points based on their own assemblage of knowledge and experience in their Code. As described in chapter eight, some coaches were observed to deliberately reject a disciplinary manner based on their belief that the New Zealand culture was not conducive to this type of regime, and deliberately chose to include more fun orientated exercise in their training for this reason.

Similarly, in chapter eight, the motivations of gymnasts for competing were described. In rhythmic gymnastics, coaches were found to use the same feminine/masculine interpretation that has been used to interpret gymnastics, as described in chapter two. However, the comments of the gymnasts revealed that there was greater complexity in their stories than a

gendered interpretation allows. The gymnasts were keen to describe the exact details of the kinds of movements required in their sport that they liked, or suggested that there were other factors, such as the attraction of the equipment, that explained interest in the sport, that are not explained by using the interpretation of the sport as feminine.

Through following and describing in this way, stories are revealed that build up an understanding of why gymnastics in New Zealand operates in the way that it does without needing a traditionally theoretical explanation as an interpretation.

Instability

In 2009, when I had completed my fieldwork, I attended a meeting where the newly appointed CEO addressed a large number of gymnastics participants. The CEO announced that she had a plan in place, and once the plan was completed, the sport would stabilise and there would be less work necessary for judges and coaches in staying up to date. This announcement was greeted with disgust by those in the room. Several coaches and judges responded by explaining to the CEO that the work in staying up to date in gymnastics is never ending and would never stabilise, that the changing nature of the sport was what they loved about it.

This thesis confirms the perspective of gymnastics as a sport which incorporates constant change. As chapter seven illustrates, coaches and judges tend to emphasise the importance of creating ways to obtain the new information, as opposed to assuming that once they know the information, it will stay current. Several coaches and judges described how they enrolled judges from overseas or watched YouTube, in order to keep abreast of the new developments in the sport. Rather than rule changes being considered aberrations, they are instead accepted as a standard part of the gymnastics assemblage and facilitate the extension of the gymnastics network to incorporate methods of finding out the new information.

In contrast to rule changes, this thesis revealed how some of the structures put in place by NZG/GSNZ are considered to be detrimentally unstable. For example, in chapter three, several alternative selection methods for selecting gymnasts into high performance were described by coaches. Here, coaches speak in terms of an effective structure being a stable one, and adopt what Law (1993) would describe as a modernist perspective in assuming that the sport would be better off if it were ordered more effectively. In this chapter, a tension was revealed between what NZG had put in place and what coaches thought should be in place. This tension played out through the selection systems changing several times from 2004 –

2009. In this situation, change was not accepted as a standard part of the network with a particular model being preferred as the ideal. For example, in 2007, the rhythmic technical committee decided to use a competition results based model as opposed to a physical testing model for selection into high performance. As the technical committee is made up of coaches and judges who have strong opinions about how selection should take place, the testing changes depending on who is on the technical committee and how they vote to proceed. Throughout this thesis, following the actants reveals how participants draw on a variety of ideas and experiences to justify their various positions, including drawing on the controversies discussed in chapter two.

The perspective of rule changes and instability as a normal part of the sport is quite different to the way that rule changes have been considered within the sociology of sport. Historically, rule changes have been seen as exceptions or aberrations and examined as creating or demonstrating a particular affect. For example, they have been considered as facilitating the spread of sport (see for example Elias and Dunning, 1986; Guttmann, 1978), as examples of the increasing commercialisation of sport (see for example Goldlust, 1987; Rader, 1984; Brohm 1978) or as reinforcing or challenging inequalities based on gender, sex, race and physical ability (see for example, Blue, 1987; DePauw and Gavron, 1995; Lenskyj, 1986; Messner and Donald 1990). This thesis instead observes how rule changes are a standard and accepted part of the gymnastics network and how coaches and judges have developed increasingly complex methods to ensure they remain up to date.

Ending the Network

This thesis is an incomplete description of the messy world of high performance gymnastics in New Zealand. It is incomplete because, as Law (1993) argues, it is impossible to describe every detail of a world. All that can be hoped for is a set of accounts that maps the moments when gymnastics in New Zealand occurs.

Lee and Sterner (1999) and Strathern (1996) note how ANT has no specific end. There is no closure of the components of a network and therefore the researcher is left uncertain where to end her research. Latour's (2005) answer to this is to stop when the participants stop or when the demands of the inscription being written are completed. In this thesis, there are times when the participants have been very definite in arguing and agreeing that a certain point is the end of the network. For example, in the discipline of aerobics, while the form of aerobics that is not under the jurisdiction of the FIG yet has highly similar rules is grudgingly considered by participants to be part of gymnastics, moving one step beyond this to other

disciplines competed at the same non-FIG World Championships, such as fitness or hip hop, was not considered gymnastics. Therefore the description in this thesis did not continue to examine this chain. Similarly, the chain of translation for determining how rules are set and how the FIG works was a natural chain that could have been followed further than it has in this thesis. However, following this chain would have involved fieldwork at the FIG headquarters in Switzerland and attendance at closed meetings which would have been virtually impossible to gain access to. Therefore, the chain stopped when it necessitated moving outside of New Zealand.

As Strathern (1996) notes, the creation of any network can both exclude certain components, and at the same time bring together apparently disparate components. In this thesis, through following “high performance gymnastics in New Zealand”, any actants who are not considered high performance gymnastics, such as the hip hop type of aerobics, or part of New Zealand, such as the workings of the FIG in Switzerland, have not been included into the network. Yet unlike many other accounts of gymnastics, this network has included disparate elements such as hair straighteners for straightening ribbons, video cameras and optometrists, which are not traditionally viewed as part of the gymnastics network, as they were observed to act as part of the production of gymnastics.

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