Weakness Bias Training

Dan Williams proposes CrossFit athletes are only as strong as their weakest links.
He proposes a way to train these weaknesses to produce better all-around athletes.

By Dan Williams   **February 2010**

Staff/CrossFit Journal

The CrossFit methodology aims to create a broad, general, inclusive fitness by increasing work capacity across broad time and modal domains. Constantly varied, high-intensity functional movements (and workouts) have been proposed as the best vehicles to reach this outcome. There is no doubt that standard CrossFit programming offers constantly varied, high-intensity functional movement—but what if there is another way to make the time and modal domains as broad as possible?

What if the high-intensity functional movements weren't so constantly varied?

Undone by Your Weakest Link?

The essence of CrossFit lies in its ability to define the previously undefined. Pioneering definitions have been created for such concepts as fitness, health and work capacity. Let's consider CrossFit as an adjective rather than a noun. I am CrossFit, as opposed to I do CrossFit. This also deserves defining. What is it to be "CrossFit?" I propose that you are CrossFit if you are generally physically prepared for the unknown and the unknowable. It comes back to that random physical task you would least like to see come out of the hopper. I propose your performance in this least-favorite task is your true measure of CrossFitness.

You are only as strong as the weakest link in your exercise chain. The weight hanging on the end of this chain is your level of general physical preparedness (GPP). The more the chain can support, the higher your GPP. If each link in this metaphorical chain represents a component of fitness (cardiorespiratory endurance, stamina, strength, etc.), the focus of training should be obvious. The first link to snap and drop your GPP is the weakest link. To increase GPP, our weaknesses should not simply be overcome but should rather be improved to match our strengths. To quote Coach Glassman in What is Fitness, "You are as fit as you are competent in each of these 10 skills." Perhaps this could be narrowed to state, "You are only as fit as you are proficient in your weakest skill."

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Jason Khalipa isn't a poor runner, but the hill-run event at the 2009 CrossFit Games was his weakest link and sunk his bid to repeat as champion.

We have a CrossFit strength bias, a CrossFit endurance bias and, for argument's sake, a CrossFit power bias (CrossFit Football). So why not a CrossFit weakness bias?

The defining and measuring of fitness is the cornerstone of the CrossFit methodology, so to have any scientific credence, a CrossFit weakness bias also requires measurement. How can this "weakest link" fitness be quantified? We measure fitness and work capacity as the "area under the curve." To measure fitness as a product of our weaknesses, we may be better off measuring the volume inside a shape.

Picture a wheel with six spokes (Figure 1). Each of these spokes represents a "trainable" (rather than "practicable") component of fitness. By measuring the proficiency in each of these six areas, we are able to score each area and assign it a position on the spoke. This position indicates our relative competency in that component of fitness using a reverse scale, with 1 indicating a skill in which we are highly proficient and 10 indicating a skill in which we are not. The measurement of each component is an issue requiring further thought, and the methods by which this can be done are numerous.
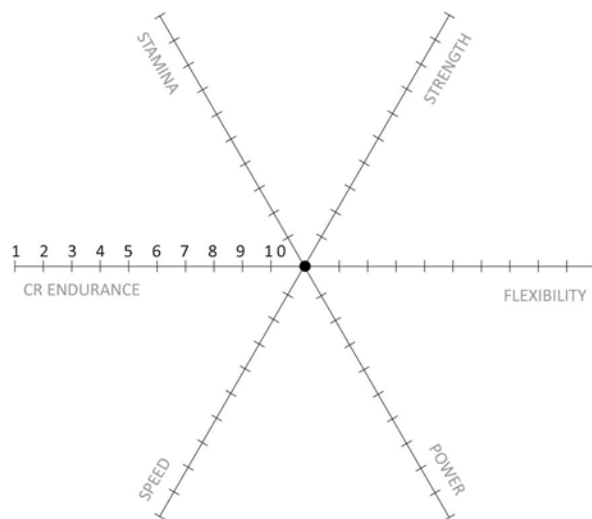
the indicated points of the spokes are joined to create our shape (Figure 2). So far, this offers us the same information as the volume-under-curve model. Where this model differs is that rather than joining the dots on each spoke, we simply draw a concentric circle that passes through the point on our weakest-scoring spoke (Figure 3). The volume inside the circle thus becomes a weakness-adjusted level of fitness.
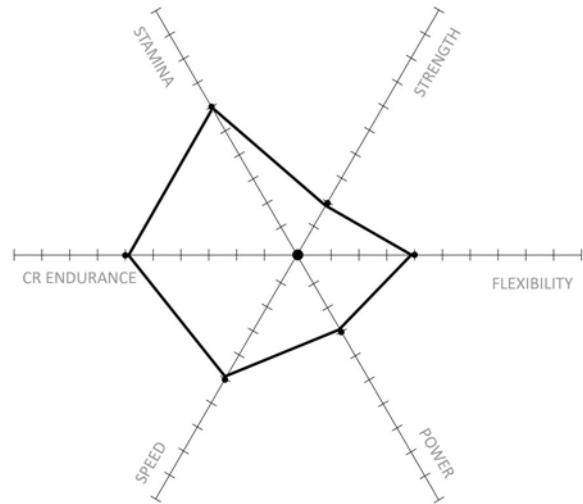

Figure 2

Figure 1

One such method may be similar to the scoring system used by CrossFit Seattle in their Athletic Skill Levels. In a simpler model, the scoring could even be done subjectively, with athletes simply assigning themselves a perceived score. Once all areas have been scored (whatever the method),
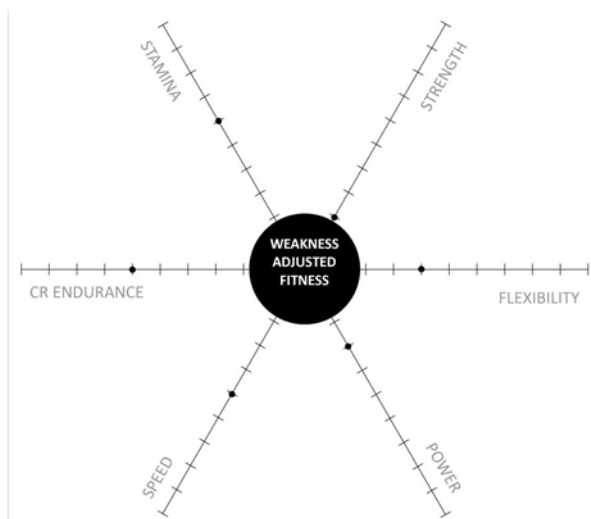

Figure 3

The current model of broad, general, inclusive fitness increases all 10 components of fitness evenly. Therefore, relatively speaking, your existing deficiencies will still apply. Relative to your own fitness, certain components will be just as deficient as they once were—you will be better at everything, though still better at some things than others.

If standard CrossFit programming chases a broad, general, inclusive fitness, and the result of this chase is the evenly distributed improvement of the 10 components of fitness (read: broad time and modal domains), then how do we define the goal of a theoretical CrossFit weakness bias. Is it broad? Yes, just not as often. Is it general? Yes, just not as often. Is it inclusive? Yes, as inclusive as standard programming.

> A weakness bias is not a replacement for standard programming … . It can be used as a preparatory program, a short-term "top up" or as a "weakness destroyer" leading up the CrossFit Games.

The variety still exists, though instead of all session types (strength, met-con, etc.) occurring at a similar frequency, an individual's strengths relegate the sessions they excel at to outliers (frequency-wise), thus increasing the frequency of sessions containing their weaknesses. Sessions the individual specializes in (those dwelling on the outside of our wheel) become less frequent and sessions where they are weak (on the inside of the wheel) form the mainstay of programming. And so we depart from specific physical preparedness and become truly generally physically prepared.

Complete Athletes Have No Goats

A marathon runner beginning CrossFit would experience a drastically sharper curve of improvement in strength than in cardiorespiratory endurance, just as a powerlifter would experience more dramatic increases in cardiorespiratory endurance. Regardless of this narrowing of the "void" between components of fitness, the void still exists.

Taking a less extreme approach, the same applies. Until the programming spits out career CrossFitters (a product purely of time, and with the current sponsorship trend it's a matter of when not if) who begin their athletic careers in the pursuit of GPP (our current CrossFit Kids), all new CrossFitters will possess some form of specialization. This is a reflection of their previous physical pursuits, whether they have strength from a bodybuilding background, flexibility from a gymnastics background, power from a contact-sports background or respiratory endurance from a track background. Even when career CrossFitters do develop, established athletes with their established specializations will continue to enter the program and the void will always be an issue. A CrossFit weakness bias can fill this void.
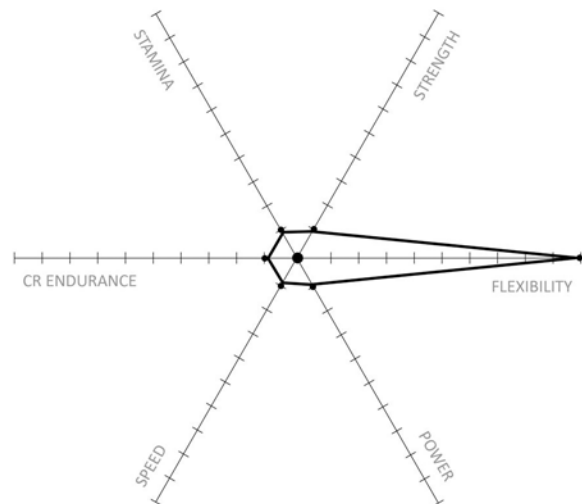

Figure 4

Much has been made of the specialist who is elite in one of the components of fitness and deficient in the other nine (Figure 4). There is no doubt that this athlete is un-CrossFit. However, the reverse may also ring true. An individual who is elite in all but one domain (Figure 5) would beat the first individual in the majority of cases, but if the weakness did come out of the hopper, he would be as deficient as the specialist.
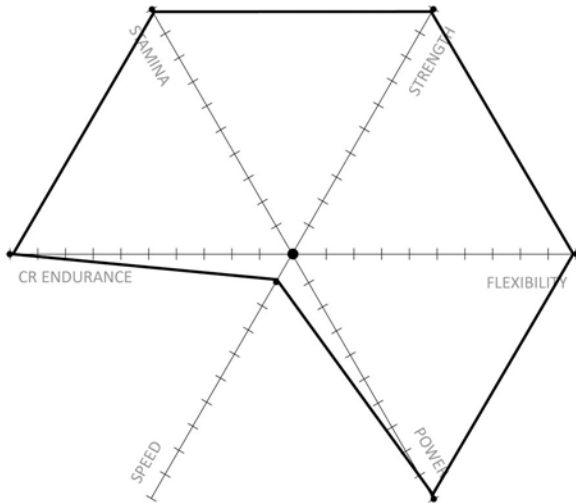
Figure 5

The wheel of a deficient CrossFitter can never make a complete revolution. In the case of the specialist or the athlete with only one deficiency, the weakness-adjusted level of fitness would be the same; that is, the circle drawn through their lowest score would intersect 1 on each spoke. See Figure 6 for a visual representation of both individuals overlaid on the same graph with matching weakness-adjusted levels of fitness. A specialist athlete would still get better at everything (as per Coach Glassman's proposition that training GPP will improve the performance of specialists more than a reliance on specific physical preparedness), but it is just that the rate and degree of improvement of the weakness will be greater.

A weakness bias does have an end point: the "smoothing of the wheel." When the weakness bias has delivered us to a point where the wheel is circular and the resultant figures across broad time and modal domains are identical or near identical, we are then at a point where broad, general, inclusive fitness takes over to become the dominant training methodology. The criteria for progression: a round wheel. The volume of the circle matters not but the uniformity of shape does (Figure 7). Until this point, a weakness bias will strengthen the GPP-supporting weak link.
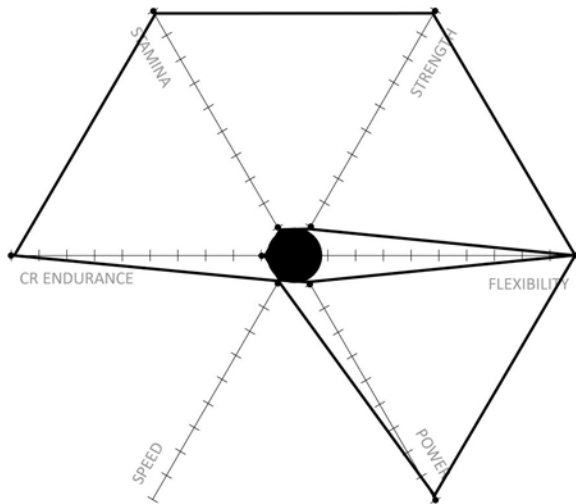

Figure 6

Think of Annie Thorisdottir and her muscle-ups in the final event of the 2009 Games, Jason Khalipa in the run (even if he was just having a bad day) or the athletes DNFing due to an inability to do strict handstand push-ups in the triplet. In the majority of cases, the misshapen wheel would turn further for the well-rounded athlete, but eventually it would get to the deficiency (as is the case with the examples above) and cease to turn.
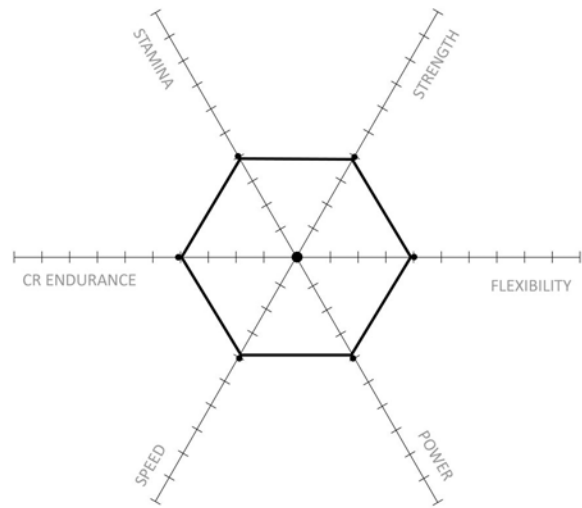

Figure 7

Here lies the beauty of the relationship between standard CrossFit programming and a weakness bias: a weakness bias is not a replacement for standard programming, just as supplemental strength training is not a replacement for dot-com WODs. A weakness-bias approach can be used as a preparatory program, a short-term "top up" or, at the other end of the scale, as a "weakness destroyer" leading up the CrossFit Games. A weakness bias smooths the circle; constantly varied, high intensity functional movements increase its size.

Determining Programming

With the concept of a weakness bias discussed, what remains to be seen is how the programming should occur to create this bias and deliver an athlete to the point where constantly varied, high-intensity functional movements and WODs take over. There are several mechanisms by which the programming for a CrossFit weakness bias could occur, and the beauty of this empirically driven, peer-reviewed journal is that if a weakness bias is accepted as a possible training method, the methodology will be organically developed by the community. I propose just one possible example:

Score relative competency in each category (of the six trainable components of fitness) in a reverse scale; i.e., 1 being strongest, 10 being weakest. An example for a typical endurance athlete may be:

Cardiorespiratory endurance: 2

Stamina: 2

Strength: 8

Flexibility: 3

Power: 8

Speed: 8

Then add the scores for each category together: 2+2+8+3+8+8 = 31.

In determining the programming, the score for each number reflects the frequency that that component of fitness will appear. For example, sessions biased toward cardiorespiratory endurance (a strength of our hypothetical athlete) will occur twice out of every 31 sessions, while power-biased sessions (a weakness) will occur eight times out of every 31 sessions.

Granted, the individual components of fitness are by no means targeted in isolation in WODs. On the contrary, fitness created in a vacuum is useable in a vacuum.

However, a high score (thus a weakness) in strength may increase the frequency of workouts such as Linda (heavy deadlifts, benches and cleans) or Diane (deadlifts and handstand push-ups), while a high score (weakness) in cardiorespiratory endurance may increase the frequency of WODs like Helen (run, kettlebell swings and pull-ups) or Kelly (run, box jumps, wall-balls).

Some components of fitness (balance, coordination, agility, accuracy) are more neural in nature and are therefore trained by performing movements with less of an emphasis on intensity. Coach Glassman attributes their improvement to practice. For the remaining components of fitness, which are improved through training, the above rings true.

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Annie Thorisdottir was an amazing raw athlete with one weakness. Only months after the CrossFit Games, she had learned how to do the muscle-ups that frustrated her in Aromas.

Weakness Programming for "John CrossFit"

It is worth exploring a practical example of an individual and tracing a hypothetical weakness bias through performance, measurement and programming. Consider the following information for John, a fictional CrossFitter. All information other than benchmark times (age, weight, exercise history) has been withheld. From this information alone we should be able to score the individual and prescribe a weakness-biased program:

> Angie
> (with blue-band-assisted pull-ups)
> 39:25

> Cindy
> (with blue-band-assisted pull-ups)
> 7 rounds

> Fran
> (as RX'd)
> 16:45 (all thrusters unbroken)

> Grace
> (as RX'd)
> 6:32

> Helen
> with blue-band-assisted pull-ups)
> 22:01

> Karen
> (as RX'd)
> 22:22 (first 50 unbroken then died)

> Linda
> (as RX'd)
> 25:37

John had respectable times on Grace and Linda. Angie was very slow, his Cindy score was low (even with the scaling), and his times were poor on Karen, Helen and Fran.

From John's performances on the Girls, we can extrapolate that he is strong, though not relative to his body weight and has low levels of cardiorespiratory fitness and stamina. He excels in any movements where an external load is used (Grace, Linda and the thruster section of Fran), while falling down in body-weight, gymnastics-type movements (Angie, Cindy and the Fran pull-ups). He also performs poorly in cardiorespiratory- and muscular endurance-based WODS (Helen and Karen).

From these results, and after a subjective scoring by both individual and coach, the following scores can be assigned (remember, 1 represents highest competency and 10 lowest):

> Cardiorespiratory endurance: 9
>
> Stamina: 8
>
> Strength: 3
>
> Flexibility: 5
>
> Power: 4
>
> Speed: 7

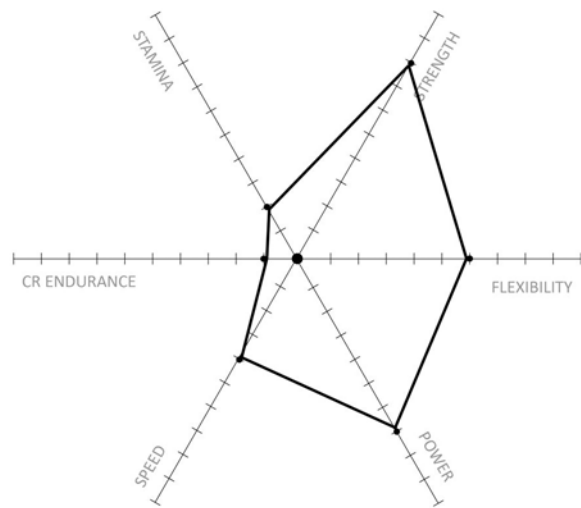Figure 8 shows a graphic representation of these numbers.

Figure 8

Discounting flexibility (which is usually trained supplementally), if we add these numbers together we get 29. We now know that cardiorespiratory-endurance-based sessions should occur nine out of every 29 sessions (30 percent of the time), stamina-based sessions should occur eight out of every 29 sessions (28 percent of the time), and strength-based sessions should only occur three out of every 29 sessions (10 percent of the time). See Table 1 on next page.

Table 1

Fitness Domain	Score / 29	% of Occurrence	Frequency of Session Type
Cardiorespiratory Endurance	9	30	Once every three sessions
Stamina	8	28	Once every four sessions
Strength	3	10	Once every 10 sessions
Power	4	14	Once every seven sessions
Speed	7	24	Once every four sessions

Table 2

CrossFit.com WODs Oct. 15-30, 2009	Weakness Bias Programming
Five rounds for time of 135-lb. hang squat cleans (15 reps) and 30 push-ups	Five rounds for time of 135-lb. hang squat cleans (15 reps) and 30 push-ups
21, 18, 15, 12, 9, 6, 3 reps of hip-back extensions with a 400-meter run after each set	21, 18, 15, 12, 9, 6, 3 reps of hip-back extensions with a 400-meter run after each set
Tyler: Five rounds for time of 7 muscle-ups and 21 95-lb. sumo deadlift high pulls	Karen: 150 wall-ball shots for time
Rest Day	Rest Day
Weighted pull-ups (1-1-1-1-1-1-1 reps)	10x100-meter running sprints with 2 minutes of rest between efforts
Tabata Something Else (pull-ups, push-ups, sit-ups, squats)	Tabata Something Else (pull-ups, push-ups, sit-ups, squats)
Four rounds for time of 50 meters walking lunges and 50 sit-ups	Four rounds for time of 50 meters walking lunges and 50 sit-ups
Rest Day	Rest Day
Tommy V: 21-15-9/12-9-6 rep rounds of 115-lb. thrusters and 15-foot rope climbs	Tabata row: Complete 2000 meters in as few Tabata sets as possible
Deadlift (1-1-1-1-1-1-1 reps)	Cindy: AMRAP in 20 minutes of 5 pull-ups, 10 push-ups, 15 squats
Michael: Three rounds for time of run 800 meters, 50 back extensions, 50 sit-ups	Michael: Three rounds for time of run 800 meters, 50 back extensions, 50 sit-ups
Rest Day	Rest Day
Nate: AMRAP in 20 minutes of 2 muscle-ups, 4 handstand push-ups, 8 2-pood kettlebell swings	Nate: AMRAP in 20 minutes of 2 muscle-ups, 4 handstand push-ups, 8 2-pood kettlebell swings
Back squat (5-5-5-5-5 reps)	Run 10K
Annie: 50-40-30-20-10 rep rounds of double-unders and sit-ups	Annie: 50-40-30-20-10 rep rounds of double-unders and sit-ups
Rest Day	Rest Day

Now again, I must emphasize that individual components of fitness are rarely targeted in isolation in CrossFit WODs, nor should they be. There is no argument that Grace is enormously cardiovascular, but a strength athlete will beat an endurance athlete more often than not. These percentages simply give an idea of the types of sessions that should occur in a higher frequency.

With the current fitness levels and their relative deficiencies measured, what remains is the prescription of a weakness-biased program, in this case, a bias toward endurance (muscular, respiratory and cardiovascular) and stamina with a lower frequency of strength- (external load) and power-based exercises. Endurance and stamina can be grouped together because similar session types cause an adaptation in each.

Table 2 contains four cycles (12 WODs and four rest days) of standard CrossFit.com WODs (Oct. 15-30, 2009), with the individualized weakness-bias programming to the right. I have endeavored to maintain the same "feel" of sessions where possible. Based on the percentages, endurance- and stamina-biased WODS should occur six times out of 12 sessions, there should be three speed-based sessions, two power-based sessions and one strength-based session.

Some comments on the differences between the original programming and the weakness-bias programming:

- The majority of the met-con-based WODs have been retained, especially those utilizing body-weight and gymnastics-based movements.

- Strength-based met-con workouts have been retained in an effort to "fortify the strengths" while still gleaning an endurance/stamina benefit.

- Low-rep max WODs have been removed and replaced with a mixture of phosphagenic, glycolytic and oxidative interval-based sessions and cardiorespiratory/stamina-based WODs.

- A more basic way of prescribing a weakness bias when following main-site WODs may be to have a list of WODs that reflect an individual's weaknesses. When a WOD comes up that is based around the individual's strengths, it is substituted for a WOD off the list.

Weakness Bias: For the Serious Athlete Only

An athlete who CrossFits five to six times a week can justify a weakness bias. Chances are this athlete has the innate drive that personifies our sport: the drive for GPP, only quenchable by the achievement of broad, general, inclusive fitness. The individual who trains two to three times a week not only has less need for a weakness bias but cannot afford it. A weakness bias for an individual who trains twice a week will seriously limit that individual's capacity to chase GPP. If the bias was toward strength, then half that individual's programming for that week could conceivably be 1RM deadlifts. The limits of this are apparent. If we use "fitness" and "health" as interchangeable terms (a concept toward which the community seems to be trending), the fitness of this part-time CrossFitter would benefit more from the randomized nature of standard dot-com programming.

Traditional exercise (unlike life) favors the specialist. CrossFit (like life) creates and favors the generalist. A CrossFit weakness bias favors the specialist looking to become a generalist and strengthens the weakest link in the GPP-supporting chain of fitness.

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About the Author

Dan Williams is an accredited exercise physiologist with a bachelor of science degree and a bachelor of exercise rehabilitation science degree. Dan is the director of Range of Motion, an umbrella company encompassing ventures within the exercise and health industry in Australia. He would gladly sacrifice his VO2 max for a faster Fran time and healthy blood pressure for sex on his 100th birthday. He can be contacted at dan@rangeofmotion.net.au.