



Pre-Season, and what we know from GPS analysis

1. What distance do players cover in games?

At senior club level distance can be anything between **5,000 and 8,000 metres**. Some players will fall outside these numbers, in exceptional circumstances, but as many as 95% of all players will fall in this zone based on a full 60 minutes.

Another, more appropriate measurement, is distance covered per minute of play (*Meterage*). Using this parameter, the 95% will fall between **85 metres and 135 metres per minute** of play. ***Meterage provides an immediate snapshot of player work rate***, in terms of distance covered, at any instant in a match.

Looking at total distance, we need to wait until the end of a game to have an accurate indicator of work rate, with *meterage* we can identify immediately if a player is working hard.

Meterage allows for comparison on a like for like basis. If a player is taken off after 50 minutes, but another plays a full 60 then total distance covered is unfair on the player substituted, as the other player had an extra 10 minutes to accrue more distance. If we refer to their *meterage* when their performance finished then we will have an accurate, like for like comparison model.

2. Are there positional differences?

This is difficult to answer. The simple answer is that there are positional differences; however, a more appropriate term would be that ***there are differences according to player roles.***

Here is an example. A traditional corner forward will cover 5,000 – 6,000 metres per match (85m to 100m per minute); however, many corner forwards are now deployed in roving / free roles and can cover up to 7,000 to 8,000 metres. Their distance is dictated by role as opposed to position.

Inside forwards, and their corresponding defenders typically cover between **5,000 – 6,000 metres** in 60 minutes, which corresponds to a *meterage* of **85m to 100m**.

Centre half backs and forwards can vary greatly according to tactical approach. Many modern centre backs, playing a holding role, will cover less distance, probably around **6,000m to 6,500m** (***Meterage: 100m to 110m***). However, a traditional centre back, tracking the centre forward and contributing to attack, will cover close to **7,000m or 117m per minute**.

Wing half forwards and wing half backs are generally acknowledged to be the 'workhorses' of most teams, providing support in both attack and defence. Any of these players who complete 60 minutes will cover **7,500 to 8,000 metres**, which loosely corresponds to **125m to 135m per minute**.

Midfield players vary, again depending on role. A typical midfielder will be similar to the wing players, delivering between **7,500m and 8,000m per match (125m to 135m per minute)**. However, a defensive midfielder will only cover **6,500m to 7,000m (110m to 120m per minute)**.



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3. Can we measure speed with GPS tracking?

Speed measurement is vital to GPS outputs. Consider this, the top distance covered is usually close to 8,000m (135 metres per minute). Break this down even further - 22 metres per 10 seconds – try **measuring 22 metres and give yourself 10 seconds to cover the distance**, you may not have to break above a walk to complete it. It's quite easy to complete at a constant pace.

GPS units can measure speed at any instant, but for analysis it is best to define speed bands, and then quantify **distance covered in each band, and how many times they complete an effort in each band**. Defined bands vary according to software and the sport scientist. Some more advanced models are tailored specifically to individuals. However, many use general speed band thresholds, defining between 3 - 5 bands.

A typical speed band outline will define 4 zones; Walk > Jog > ½ Pace > ¾ Pace plus. Some may add an extra zone at the top end to separate outright sprint efforts.

Through speed analysis a profile can be developed to define **how much of a players' total distance was completed in each of the defined speed zones**. Take this example; a player has completed 7,700 metres in a match. Using speed analysis we know they completed 3,775m walking, 1865m jogging, 1720m at ½ pace and 315m at ¾ pace plus. This works out at 49% of total distance walking, 24% jogging, 22% at ½ pace and 4% at ¾ pace plus. Already we are much better equipped to understand physical demands of the game, and measure effort level of the player, than if we just had total distance available.

A common approach is to quantify everything above half pace as high intensity running, and measure this volume of running as a **percentage (HI%)**. This is a figure which is instant and, similar to meterage, can provide an **accurate snapshot of player effort level** without needing to wait until total figures are available post match. In the above example, the player delivered a HI% of 26%.

Typical HI% values range from 20% - 40%. The pattern according to position is similar to distance, those covering lesser distances also complete less at high intensity – between 20% - 30%, while those covering greater distance will cover more ground at high intensity – 30% - 40%.

This can be explained by activities common to position. Players covering greater distance normally play out **towards the middle third of the pitch**; therefore the majority of efforts are in a linear direction, up and down the pitch. However, consider the inside positions, running requirement is more multi-directional and reactive to what is happening out the pitch – these players get less opportunity to accelerate to top speed before having to react to play development and change the direction of their run.

4. Does this mean players out the pitch work harder than inside line players?

Not necessarily. **Consider fuel consumption and wear & tear on a car**. Town driving is less economical and places more maintenance requirements on a car than the 'motorway' miles. Constant acceleration, braking, cornering, parking and manoeuvring experienced in town uses



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more fuel than keeping the car at constant speed on a motorway. It also places more demand on tyres, brakes, gear box, engine etc. than on a motorway run.

Given the above, it takes less distance for a car to run out of fuel, and experience breakdown due to wear and tear than when operating in the town compared to the motorway.

Now, consider our players and our pitches in the same light. **Middle third players are operating on motorways, up and down the length of the pitch**; covering lots of distance, but doing so at a steady, albeit solid, pace. The long run requires frugal energy consumption and places little pressure on joints and muscles. **Inside players are town drivers, in around the 'D'**, constantly changing direction, starting and stopping. Each effort uses a little bit of fuel, but there is much more starting, stopping and changing direction than our motorway men despite never getting up to 'motorway' speed. On top of that, joints and muscles of 'town drivers' are under pressure constantly as they react to other players and developments in front of them and are forced to change direction quickly – this puts a lot of pressure through muscles and joints.

5. Can we measure these differences using GPS?

Firstly, we can look at the number of efforts each player completes within a particular zone. To break this down, if our number 7 completes 500m in the $\frac{3}{4}$ pace zone, but our number 4 only completes 250m in the $\frac{3}{4}$ pace zone, this information would lead you to believe that the number 7 worked twice as hard. However, **No. 7 completed 25 efforts**, with an average of 20m per effort, and a maximum effort of 65m. The **No.4 also completed 25 efforts**, with an average of 10m per effort and a maximum of 25m. The question then is not as simple to answer. To accelerate to $\frac{3}{4}$ pace and stop suddenly (10m) will put more pressure through the body than doing so over a longer distance (20m). Speeding up, and slowing down gradually requires less energy expenditure in the muscles, and places less stress on joints, than if the same process had to be done as fast as possible.

Think of it this way; If asked to run 100m in a straight line at a solid $\frac{3}{4}$ pace, or, complete 50m in a series of 5x10m efforts, nonstop, **which will be more difficult?** They are probably a similar level of difficulty when we factor in the sudden decelerations and accelerations required, **despite the fact that the 100m run is twice the total distance.**

Modern GPS technologies allow us to record accelerations and decelerations. **In other terms, it allows you to record high effort starts (reactions) and high effort stops (changes of direction).** Inside line players generally record a similar number of accels and decels as players out the pitch. When we consider the inside players cover less distance and allow for this, **we find that inside players perform more high intensity accelerations and decelerations per 1,000m** than players in the middle third.

So, to revert to question 4, we can begin to build an appreciation as to how complicated this question is to answer. When we look beyond the distance covered, and pay heed to more intricate numbers, **we begin to understand the many factors that interlink to constitute 'work'**. All things considered, most players appear to put a similar shift in, albeit with some exceptions at both ends of the spectrum. **What we, as coaches, need to understand is that the method of**



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work for one player will differ greatly from the next player. There may be sub groups within a team that 'work' in similar ways, and this is worth considering when planning training.

6. Is position specific training possible with GAA teams?

There will be differing opinions on this theory. From an exclusively sport science perspective it is very possible, and should be enacted, with each player trained to the specific demands of **their position**. However, therein lays an issue which is more prevalent in Gaelic games than in most other invasion games – **fluidity of position and adaptability of players to interchange positionally**. Regularly, a half back will switch to the full back line, or vice versa, a centre forward may drop to midfield etc. How often do we see a corner back pop up to take a score, or a corner forward blocking a shot or pass in their own territory? **Training players exclusively to specific physical needs of 'their' position could, and probably would, prove to be counterproductive** and limiting from the point of view of adaptability and a team's ability to deal with adversity.

The nature of the game is too dynamic to structure complete training plans on position specific demands. **Position specific training is not realistic, nor is it an effective use of time** when you consider the limited 'hands on' training time available to a typical club team.

7. How can we apply this knowledge to our training?

The only means of replicating the dynamic nature of physical exertion required in games is to do just that, play more games. Physical demands within GAA games are dictated by reaction to other players and the ball. By using games to train we allow players to work on the same basis. Coaches can condition games to sway physical demands in the direction in which they want to emphasise. As an example, if we have 30 players, and we want to focus on agility, we could divide our group into 6 groups of 5, and play 3 x 5v5 games, in much more restricted areas. We may choose to only allow hand passing, limit number of touches or alternate scoring methods as a means of making the game competitive and mentally demanding. **The creative coach will develop effective conditions to ensure players are developing the intended aspect of fitness and / or skill.**

Using this conditioned game, we develop a full range of fitness components, but place greater emphasis on agility than if we were to play a full, unconditioned match. **We also allow players to develop skills** (which skills can be dictated by conditions), **decision making** and, by alternating scoring methods, we can help **develop tactical aptitude.**

Anecdotal GPS evidence indicates players deliver similar, and potentially more impressive, outputs when involved in game based training than when performing exclusively physical efforts. The advantage from a coaching standpoint is that players are also getting to develop other areas essential to successful performance – **decision making, skill development, tactical aptitude.** **It allows the coach to get maximal development from relatively limited hands on time.**