# *Sony Ericsson Run to the Beat*

## Music is the spark that ignites your running flame!

**Music and the Sony Ericsson *Run to the Beat***
The music that will be played throughout the Sony Ericsson *Run to the Beat* half marathon has been scientifically selected to lift your mood, alleviate your fatigue, and match the physiological demands of the event, which increase as the finish line approaches. The run will be alive with sound as we deliver a kaleidoscope of motivational tunes along the entire length of the course using the latest wireless speaker technology. Based on research carried out with Sony Ericsson *Run to the Beat* entrants in 2008, we have a special focus on the four most popular genres (pop, rock, urban, and dance) which will be stylishly interwoven throughout the course.

**The science behind the beat**
The sight of a lone runner gliding effortlessly to the pulsating beat of an *iPod* is now commonplace; yet it is easy to forget that the advent of this marriage between movement and sound is only a recent one. Over the last 10 years, there has been a dramatic increase in research on the physical and psychological effects of music in sport and exercise settings. For this reason, there is now a clear theoretical background which we can use to explain and even predict the effects of music in these settings.

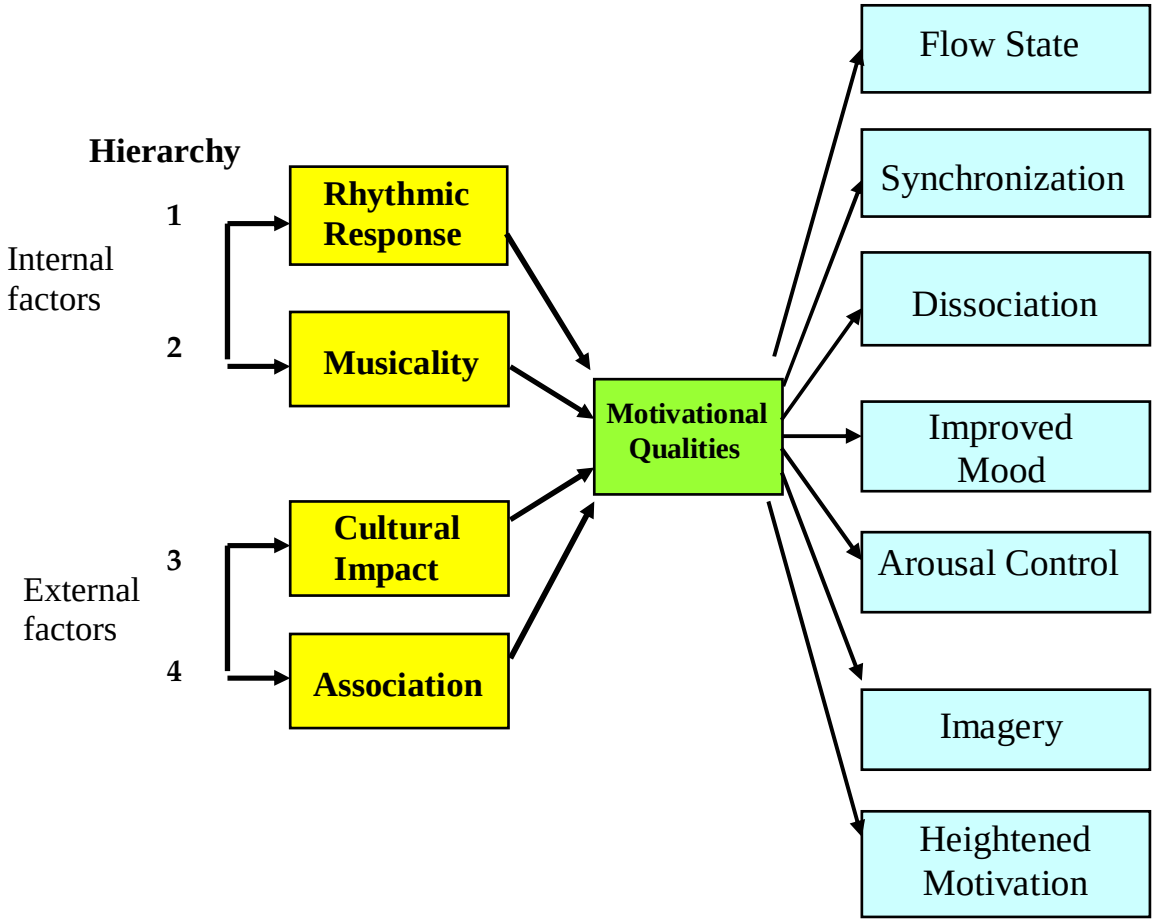
**The music in sport research group**
The work has been driven by a pioneering group of researchers from the School of Sport and Education at Brunel University in West London. The programme of research, led by Dr Costas Karageorghis, a Reader in Sport Psychology, has resulted in more than 100 publications that have impacted on how sport and exercise participants the world over tap into the power of music.

**Modelling the benefits of motivational music in sport and exercise**
What characteristics of music are most important in determining how we respond to any given musical selection? We have identified four factors which contribute to the motivational qualities of music (see diagram below). Of these four, the two most important are called *internal* factors because they relate to the structure of the music itself, and the lesser two factors are called *external* because they relate to how the listener interprets the music.

**'Internal' factors**
The internal factors include *rhythm response* and *musicality*. Rhythm is considered to be the most significant factor in determining how we respond to a piece of music. The key aspect of rhythm is tempo which is the speed of a piece of music as measured in beats per minute (bpm). It is important to emphasise that tempo is a key aspect of music selection in running. Motivational music typically has a fast tempo (> 120 bpm) and a pronounced rhythm that promotes a physical response and increased energy levels. Fast music with a pronounced rhythm makes us feel energetic and encourages us to be physically active; simply consider

the global phenomenon of dance culture or the way that the stimulus of a strong beat often prompts an unconscious motor response such as nodding your head or tapping your toes.

The second of the internal factors is known as *musicality* and it consists of the non-rhythmical aspects of musical structure such as melody, harmony (the way different notes sound together when played at the same time), and the musical instruments that are used. Motivational music has memorable melodies, and a bright, uplifting harmonic structure and sound. Consider a tune like *The Best* by Tina Turner or *Search For The Hero* by M People, both of which typify motivational music.



**'External' factors**
Of the two *external* factors, the most important is its *cultural impact* within society. Such impact is enhanced through repeated exposure to a track through radio airplay or use in a TV advertising campaign. We tend to respond better to music that we are familiar with because its positive effects have been *conditioned*.

In addition to this, our musical preferences depend very much on our cultural background; what kind of communities we grew up in and what type of music we were exposed to in our youth. It's no surprise then that rap music is much more likely to motivate teenagers growing up in urban environments than middle-aged people who live in the countryside. This year, there is a focus on the four most-popular genres reported by competitors in the 2008 Sony Ericsson *Run to the Beat*: *Pop*, *Rock*, *Urban*, and *Dance*. Urban will comprise both *Hip Hop* and *R'n'B*.

The second *external* factor is *extra-musical association* which concerns the cultural connections relating to a piece of music. For instance, the theme for the popular *Rocky* series of motion pictures (Gonna Fly Now, composed by Bill Conti) which is linked with images of Sylvester Stallone as the archetypal underdog fighting against the odds.

**What are the main effects of music during running?**

- **Flow State**: Music promotes a state of optimal absorption and focus that is known by psychologists as '**flow'** and by athletes the world over as 'being in the zone'. Flow state is quite literally a higher state of consciousness that holds the key to your optimal potential. It is characterised by numerous factors including a distorted sense of time, a lack of negative self-judgements, a perfect balance between the challenges you face and your level of skill, and immersion in your running activity.
- **Rhythm response and synchronisation**: As early as 1902, scientific work revealed that human beings have an innate tendency to coordinate movement with the **rhythm** of musical sound. Synchronising your movements with music enables you to perform more efficiently and results in greater physical endurance. In one of our recent studies, subjects who cycled in time to music found that they required 7% less oxygen to do the same work when compared to music playing in the background. The implication is that music has the potential to make you more energy efficient.
- **Dissociation**: At lower exercise intensities, a piece of music that is carefully selected can inhibit sensations of fatigue which makes the exercise experience more pleasurable. Our research shows that the dissociation effect results in a 10% reduction in perceived effort during treadmill running at a moderate intensity. At very high running intensities however, perceptions of fatigue block out the impact of music.
- **Improved mood** and feeling states. Well-selected music enhances the positive dimensions of mood such as vigour, happiness and excitement while reducing negative aspects such as tension, depression, anger and fatigue.
- **Heightened arousal**: Music serves as a type of stimulant or sedative prior to competition to ease your nerves and curb your pre-race anxiety. Some athletes, like

triple-Olympic gold medal-winning sprinter Usain Bolt, use very upbeat music to psych-up, while others, such as double-Olympic gold-medal winning middle distance runner Dame Kelly Holmes, use slow-tempo music to psych-down. Music is considered by some athletes as a "legal drug" with the added advantage of no unwanted side effects!

- **Imagery and conditioning**. Runners form strong associations with particular musical selections. For example, Vangelis' composition *Chariots Of Fire* conjures up inspiring images of Eric Liddell's surge for the finishing tape in the 1924 Paris Olympics. Associations work through a process of classical conditioning. Over time, one comes to link a given stimulus with a certain emotional state; eventually that stimulus will come to serve as a trigger. Actively rendering imagery in your mind will heighten its effect; a tactic known by elite athletes as 'going to the movies'.

**What happens when the going gets tough?**
Very recent research has shown that although music does not reduce the perception of effort during high intensity runs (above 75% of aerobic capacity), it does improve the *experience* of the run; in other words, it makes the run seem more enjoyable and impacts upon how your mind interprets the symptoms of fatigue. For this reason, if you are running up a hill at 80% of your aerobic capacity, listening to music will not necessarily make the task seem any easier; however, you are likely to interpret the experience in a far more pleasurable way. Studies have shown that music results in a 10% increase in pleasure during endurance activities and a 10% decrease in perceived exertion. However, the observed decreases in perceived exertion only apply to intensities lower than 75% of aerobic capacity.

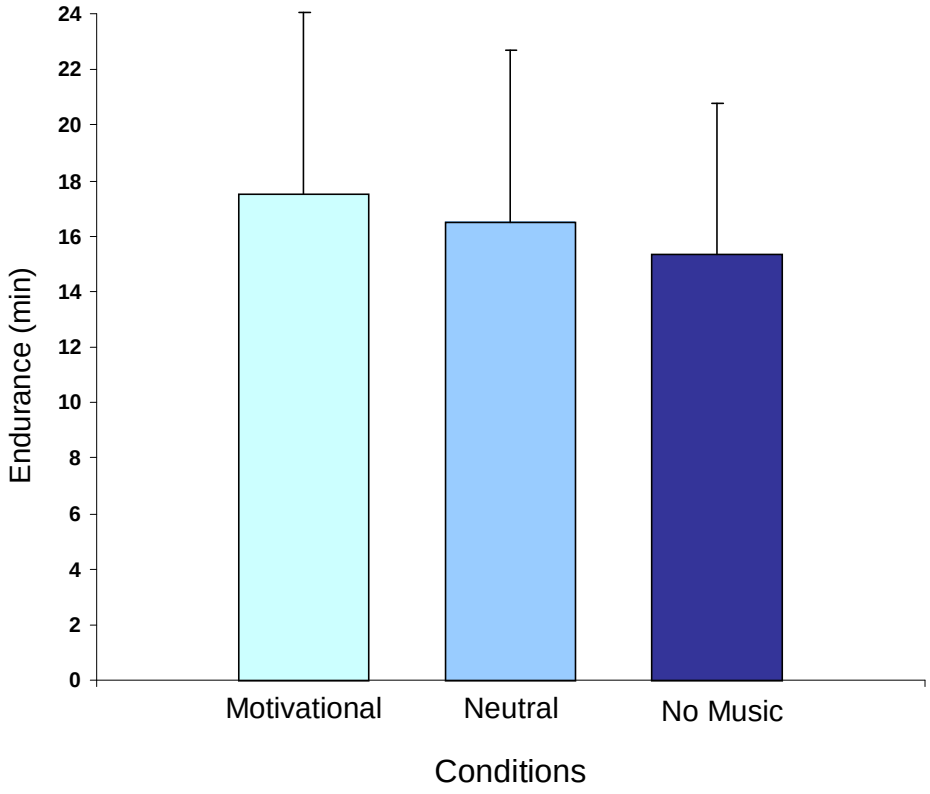
**Synchronising music and running**
In order to derive the maximum benefit from music in your running, it is important to coordinate your selections with your running pace and cadence. For example, celebrated Ethiopian distance runner Haile Gebrselassie says that he can synchronise his movements to a musical beat. This enables him to regulate his stride rate and improve his efficiency, which makes a hard run seem far less arduous. It might also enhance the stylistic aspects of his movements. Gebrselassie is famous for setting world records running in time to the rhythmical pop song *Scatman*. Find your own equivalent of *Scatman* which coincides with your optimal stride rate.

In a study we conducted back in 2006, we found that subjects were able to run 400 metres faster when they were pacing their strides to the beat of the accompanying music. This effect was even stronger when the music was selected according to its motivational qualities. When the motivational music was compared to a no-music control, it reduced 400-metre time by about half-a-second on average.

More recently, we have investigated the effects of synchronised music on treadmill endurance. Thirty subjects synchronised their stride rate to the tempo of the music which was 125 bpm. Before the experiment, a pool of music was rated using a questionnaire we developed (the Brunel Music Rating Inventory) and we selected the most motivational pieces for the treadmill test. The subjects were given a choice of either 'pop' or 'rock' music, genres which form part of the music strategy being employed for the 2009 Sony Ericsson

*Run to the Beat*. When compared to a no-music control, we found that the motivational synchronised music led to a 15% improvement in endurance (see graph below).

Means scores for treadmill walking endurance under conditions of synchronised motivational music, synchronised neutral music, and a no-music control




(from Karageorghis, Mouzourides, Priest, Sasso, Morrish, & Whalley, *Journal of Sport & Exercise Psychology*, 2009, Vol. 31, 18-36)

**Exercise heart rate and preference for music tempo**

It is important to contour the tempo of a musical programme to match one's expected heart rate during a run and this is a premise of the music policy for the Sony Ericsson *Run to the Beat*.

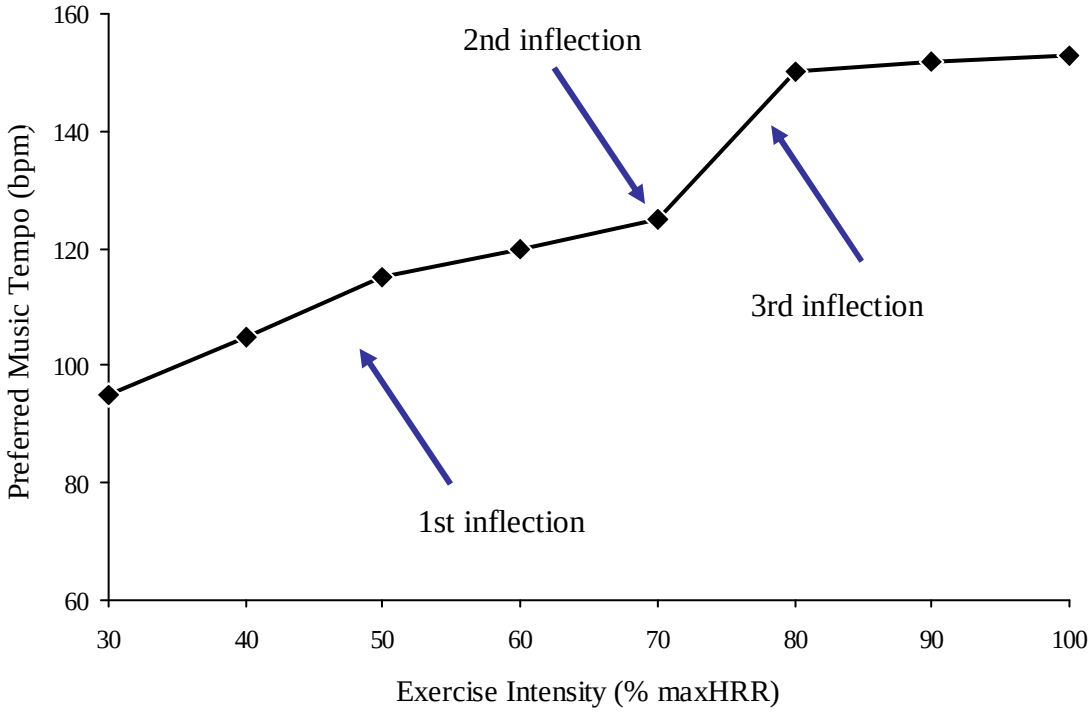
The initial work in the area was undertaken by Canadian and Japanese researchers who concluded that there should be a direct correlation between heart rate and musical tempo. In other words, as we exercise harder we prefer faster music. In the Music in Sport Research Group we have always held the view that the relationship is more complex in nature. A string of studies has built up a picture of how these two variables interact and the latest hypothesis or prediction appears in the diagram below.

It is thought that the relationship is described by a series of 'inflection points' which deviate from the direct linear correlation that is represented by a straight line. In particular, there

should be a sharp jump in tempo preference at around 70-80% of max heart rate; an intensity which corresponds with the 'anaerobic threshold'; a point when runners undergo a switch in the pathways they use to generate energy in their muscle cells.

We also hypothesise a 'plateau' at higher exercise intensities whereby a runner does not continue to prefer ever-faster music. This may be because very fast music (> 150 bpm) is less common so we are not conditioned to listening to it. On the other hand, it may simply be that very fast music is too complex for the brain to process when an athlete is running at near-maximal intensity.

Predicted relationship between exercise heart rate and preferred music tempo (adapted from Karageorghis & Terry, 2009)




Karageorghis, C. I., & Terry, P. C. (2009). The psychological, psychophysical and ergogenic effects of music in sport: A review and synthesis (pp. 13-36). In A. J. Bateman & J. R. Bales (Eds.), *Sporting sounds*. London: Routledge.

**Selecting music for training**

What should you bear in mind when picking music for running? Here are some essential guidelines:

- Marry the music to the **activity** you are undertaking and the psychological effect you want to experience. For example, loud, fast, rhythmical, percussive, bass-driven music is great for psyching yourself up before interval training.
- Consider the **tempo** - is the speed of the music and its rhythm (pattern of beats over time) ideal for your running cadence?
- How **intense** is the activity: generally speaking you will need faster music if you are running at a faster pace (music of 130-150 bpm is ideal for high-intensities).
- Does the **tempo** of the music **contour** your expected **heart rate** during your run?
- Has the music got a **rhythm** (beat) that makes you want to run?
- Do the **lyrics** contain positive **affirmations** of running such as "keep on running", "born to run" or "run to the beat"? Other positive statements such as "moving on up" or "I believe" also lead to positive motivational consequences.
- Does the music create **imagery** in your mind that is motivational; maybe through associations the piece has within popular culture (e.g. the "Rocky" film series soundtrack) or through personal memories?
- Does the music **remind you** of your adolescence, early adulthood or another passage in your life that evokes positive feelings for you?
- Does the music possess a pleasing **melody** and **harmony** (combination of notes played at the same time that shapes the emotional "colour" of the music) which improves your **mood**? Generally speaking, major (happy) harmony is more appropriate for exercise than minor (sad) harmony.
- Does the music emanate from the **genre** (e.g., **'pop'**, **'rock'**, '**urban'**, or **'dance'** etc.) which you grew up with and identify with?
- Does the music make you feel excited or '**psyched-up**'?
- Does the music evoke a **positive** state of mind?
- Does the music make you feel **confident** and does it promote **motivational thoughts**?
- Are you **familiar** with the music without finding it tiresome owing to overexposure to it?

**Designing a music programme for training**

**Pre-task music**

When using music before a run, an important consideration is for your music programme to build you up gently, so that by the time you switch off the last track, you are in an optimal psychological state to either train or compete. The last piece that you hear is the one that is most likely to linger in your head, so always leave the most inspirational track until last.

A good example of pre-task music from Olympic sport concerns the acclaimed American swimmer Michael Phelps who won an unprecedented 15 gold medals (Athens and Beijing). Prior to each race, his 'rapcentric' playlist helped him to prepare mentally so that he was able to calmly and decisively seize the moment. Phelps put his positive pre-race mindset down to his use of inspirational tunes.

A second consideration is that the music programme should be carefully contoured around your pre-race routine. Accordingly, you may wish to increase the tempo for a warm-up jog while slowing it down for stretching and visualisation of your event. Some athletes feel lethargic as they arrive at a competition venue after a long journey so a little extra stimulation might be required for the initial part of the warm-up; a track such as *Lifted* by the Lighthouse Family is perfect in this regard.

**Building your music programme**

We would encourage you to have a go at moulding a music programme around your running activities and discover the benefits of some well-selected tunes. Start by assembling a wide selection of tracks with driving rhythms and positive lyrics then mix them appropriately. Using *iTunes* or similar software is a great boon as it permits you to query your entire music library and effortlessly amass and organise a suitable pool of selections. Ensure that you have tracks at different tempi to coincide with low, medium and high running intensities. The table below will get you started by giving you an idea of motivational tracks suitable for four intensities of running in the four most-popular styles of music among Sony Ericsson *Run to the Beat* entrants.

Examples of motivational tracks for different running intensities (based on a 34-year-old British female athlete)

| Running Intensity | Music Genre | | | |
|---|---|---|---|---|
| | Pop | Rock | Urban | Dance |
| 55% max HR (approx. 100 bpm) | *Faith*<br>George Michael | *Mrs Robinson*<br>The Lemonheads | *Rock Your Body*<br>Justin Timberlake | *Galvanise (Push The Button)*<br>The Chemical Brothers |
| 65% max HR (approx. 120 bpm) | *The Sweet Escape*<br>Gwen Stefani | *Whatever You Want*<br>Status Quo | *She's Like A Star*<br>Taio Cruz | *Call On Me*<br>Eric Prydz |
| 75% max HR (approx. 140 bpm) | *That's Not My Name*<br>Ting Tings | *Somebody Told Me*<br>The Killers | *21 Seconds To Go*<br>So Solid Crew | *Insomnia*<br>Faithless |
| 85% max HR (approx. 160 bpm) | *Don't Stop Me Now*<br>Queen | *What A Wonderful World*<br>Joey Ramone | *Pump It*<br>Black Eyed Peas | *Rockafeller Skank*<br>Fatboy Slim |

**Case Study: Julia the Marathon Runner**

Julia Clarke is a marathon runner who runs several hundred miles in training each month. This is often a very solitary and punishing task with little variety. Julia's coach, a former Australian marathon record-holder, aims to make her a more efficient athlete. In order to do this, he tells her to relax and not waste energy through unwanted muscular tension. She focuses on letting the tension in her jaw, neck, and fingers drain into the tarmac with every new stride. To help her achieve these aims, Julia uses an mp3 player during her longer training runs. She listens to soulful ballads and soft, relaxing music. The acapella vocal group *Ladysmith Black Mambazo* performs her favourite music. She associates the timeless African harmonies she hears with the fine tradition of distance running in East Africa, and this is a source of huge inspiration to her: The choral tones create a positive mood while the lilting rhythms and slower tempi help her to relax and maintain an efficient and steady running rhythm; accordingly she is able to conserve energy more effectively in the early stages of a run. The music also becomes a distinct focus in the latter stages of a run and distracts her from negative bodily sensations such as the aching of her calves and the burning feeling in her lungs. In fact, the effects of the music can be quite hypnotic for Julia, and, after a while, she feels as though she is just floating along.

*Dr Costas Karageorghis is a Reader in Sport Psychology and head of the world-renowned Music in Sport Research Group at Brunel University in west London. Recent publications can be viewed at: http://bura.brunel.ac.uk/items-by-author?author=Karageorghis%2C+C+I*