clarke saunders acoustics

# DIFFERENCES IN SOUND CHARACTERISTICS OF PADEL AND TENNIS

CLARKE SAUNDERS ACOUSTICS WHITE PAPER

## Introduction

Padel, also called Padel Tennis, has been popularised in Spanish speaking countries following its invention in Mexico in 1969. It is a relatively new and fast-growing sport in the UK, it having gained popularity in Europe over the last decade.

Proponents of the game describe it as easier to pick up and reach a reasonable level of competence than tennis, with players of differing abilities more easily able to play together. As a result it is said to be more sociable and accessible, and is therefore an attractive proposition for tennis clubs to add to their offering.

Consequently a number of tennis clubs in the UK have built, and many more are considering construction of Padel courts which, due to the nature of the enclosing screen structure, require a planning application.

Meanwhile, local authority environmental health practitioners are starting to express concerns over whether the sound generated by this activity is more disturbing to the residential amenity of neighbours than 'normal' tennis, and to what extent this ought to be catered for in the planning process.

At CSA we have been instructed to assess the noise impact of a number of Padel court planning applications, variously on behalf of the applicant, concerned neighbouring residents and the local planning authority.

This white paper presents the results of a non-project specific 'deep dive' into the matter, which we intend to use as the starting point for broader discussions with other acousticians, the Padel industry, and local planning officials.

## Scope

Our study is intended to address the knowledge gap at the heart of the potential planning issue around construction of Padel courts;

*Is Padel demonstrably more disturbing than Tennis?*

Human response to sound is very complex and subject specific. Metrics we use to assess other noise sources, such as aircraft noise for example, are based on averages of large social survey responses, rather than any individual's specific reactions. To answer this type of question comprehensively, therefore, requires extensive dose-response relationship studies which are beyond the scope of this exercise.

Our slightly modified aim, therefore, is to identify objective aspects of sound generated by Padel play which quantify the differences in technical characteristics between the sports perceived by the listener.

Follow up studies might then be able to go on to consider the significance of these differences and work towards providing guidance on to what extent and in what circumstances mitigation is warranted, and if so what form this might take.

## Functional Differences between Tennis and Padel

On a fundamental level the sports are very similar. The court layout, scoring and gameplay of Padel is almost identical to tennis, the primary differences being a physically smaller court with enclosing walls to the rear (extending partially to the

sides) which allow rebounds, and shorter solid rackets, originally referred to as 'paddles'.

Our review included observing both Padel and tennis matches in progress at a local tennis club[1], reviewing footage of elite level competitions online and conducting controlled noise survey measurements while also experimenting with playing both games at a novice level.

It is clear that Padel features longer, more frequent extended rallies involving exchanges of volleys. Serving is always underarm in Padel, requiring less preparation and the contained court reduces time spent retrieving balls.

Tennis features more forceful hitting and more powerful serves, but less frequent impact sounds. Singles tennis features less frequent rallies of volleys than doubles. Padel is always played as a doubles sport by default.

Padel allows rebounds from the glass walls, and occasionally the ball is struck directly against the wall to rebound into play.

**Literature Review**

We reviewed readily accessible public domain information from planning applications across the London Boroughs and other UK metropolitan authorities. This search identified 18 noise impact assessments undertaken by a range of other consultancy firms (we excluded our own CSA reports).

Of these assessments, 15 relied on information gathered from noise surveys at other Padel courts, two used the generic guidance given in Sport England's Design Guidance Note[2], and one was based on typical data provided by the client. Some companies used the same source survey data for multiple assessments, such that we have a range of noise data from seven individual Padel court surveys, in additional to those we have conducted at CSA.

The surveys ranged from single courts to multi-court regional Padel centres. Some contain information on the skill level of the players involved and the nature of the games – from novice instruction to social and competitive.

Most surveys differentiated between noise emissions to the side, where the Padel court is open, and to the ends which are enclosed by the glass walls. A number of them then went on to helpfully quantify noise levels at increasing distance from the court, which is helpful in understanding the nature of the transition from near to far field propagation characteristics.

In assessing the significance of the Padel noise, most reports provided a comparison with otherwise prevailing ambient conditions in the absence of Padel activity to set the impact in the context of the surrounding soundscape. In most instances, the context being at a facility where tennis was already being played, this involved a comparison between Padel and tennis.

In a number of instances, the differences between the two sports were based on conjecture only, assuming for example that the slightly lower pressure and slower hitting speeds involved in Padel would make the individual noise events slightly

[1] Winchester Racquets and Fitness – with thanks for their assistance
[2] Sport England Design Guidance Note – Artificial Grass Pitch (AGP) Acoustics (2015)

lower in level and therefore the noise emissions overall slightly quieter. This does not seem to be consistent with the findings of assessments which involved comparative survey measurements.

In some of the reports there was inconsistency in the direct comparisons due to the different sizes of the courts and the resultant ambiguity over the location of the source in each case with respect to the measurement location.

Little differentiation is provided in the character of the hitting sounds of tennis racket versus Padel racket on ball, the majority of reports stressing the similarities rather than identifying any differences.

**Head-to-head Comparisons**

Informed by previous assessments of our own, and the review described above, we undertook specific tests to better understand the differences between the sports we were starting to identify.

These tests have provided us with objective data on the following aspects, which helps us to quantify the sounds associated with Padel, to present the extent to which it can be differentiated from tennis in particular.

*(a) Impact Sound Character*

Padel rackets are not strung like tennis rackets[3], they comprise a solid EVA rubber core and a fibreglass or carbon face. The racket face is perforated with holes to allow it to be moved through the air more easily. The resultant impact sound differs audibly from a tennis ball strike, which is slightly more resonant. In onomatopoeic terms, we have used the words 'thunk' and 'bop' to characterise tennis and Padel impacts respectively. Although clearly audible, some of the analyses reviewed from other practitioners did not show the difference clearly using an octave band spectrum comparison, although it can be identified in our own data and through more sophisticated analyses.

*(b) Impact Sound Level*

As noted above, differences in court size, and therefore variations in noise source to measurement location distances, plus the influence of the glass end walls acting both as acoustic barriers and reflectors, make the direct comparison of the noise output level from the tennis and Padel a non-trivial exercise. These factors need to be considered very carefully when making comparisons between different racket sports. In the context of the configuration and alignments of the courts we at CSA have studied, depending on the assessment metric used and the nature of the comparison, Padel tends to give rise to slightly higher levels of sound than tennis.

*(c) Wall Impacts*

Although mentioned in a number of the other assessments reviewed, our experience is that the ball-wall impact sound is much less significant than ball strikes. The ball hits the glass walls most frequently after first bouncing on the floor, so is traveling relatively slowly. Shots involving a ball strike

[3] 'Racket' is preferred to according to the OED, but racquet is an accepted alternative spelling.

directly against the wall are relatively infrequent in gameplay, and tend to be finesse shots, rather than the kind of power strike that squash players may be accustomed to – this is an ineffective strategy that a player is only likely to ever attempt once.

*(d) Strike Frequency*

The increased strike frequency of Padel over tennis is more marked at elite competition level. At world tour major finals events a tennis ball is struck typically every 8 seconds on average during a men's singles match, during which there are significant pauses between points, reducing only slightly to 7.5 seconds in doubles, whereas the comparable figure in elite Padel world tour finals is one hit every 2.8 seconds.

This differentiation is much less marked at the amateur level. From our own tests we saw a hit rate of once per 3.3 seconds for doubles tennis and 2.0 seconds for Padel. Differences in strike frequency become significant when considering the merits of comparing event noise maxima or energy average noise levels over time.

**Conclusions**

It is clear that there are both differences and similarities between Padel and tennis. We have studied the differences in more detail and developed some technical descriptions of the key aspects identified, while also recognising areas in which the sports are similar.

We can only answer the question set at the outset of this paper in an equivocal sense, however. We have identified, and to some extent quantified some of the differences in the sports, but the extent to which these differences can be established to illicit a different response in terms of neighbour disturbance cannot be determined without studying the experiential aspects of these differences from the perspective of neighbouring residents.

As numbers of applications continue to rise for Padel courts, it may be useful for the Padel industry to engage more widely with acoustics practitioners. This would increase the knowledge base and help define guidelines in terms of assessing noise impacts, both as absolute levels and when considered in comparison to existing tennis courts and/or other sports and recreation facilities.

Clarke Saunders Acoustics is an independent consultancy practice specialising in applying both rigor and pragmatism to real world challenges. We are actively engaged in development of best practice guidance and standards across the acoustics industry, collaborating with colleagues, stakeholders and decision makers. To continue this discussion on Padel noise, or any of the other multitude of areas in which acoustics touches all our lives please reach out to us at mail@clarkesaunders.com [redacted]