



Consolidated report on the journey of bringing the tranquillity rating prediction tool (TRAPT) indoors within a youth centre for marginalized and vulnerable young people

J. Oatley^{1*}

M. Swale¹

¹ Cirrus Research plc, Bridlington Rd, Hunmanby, YO14 0PH, Filey, UK

ABSTRACT

Tranquil environments are considered quiet, peaceful places where people can get away from everyday life, and for many years the University of Bradford's Tranquillity Rating Prediction Tool (TRAPT) has been used to successfully predict the perceived tranquillity of outdoor spaces as a function of their auditory and visual modalities. The Warren, Hull, established 1983, is a citywide free project for marginalised and vulnerable young people aged 14-25 that helps to encourage and support them to take control of their lives and futures by engaging them in all the decision-making that has impact upon the strategic and day to day running of project. This short paper provides a consolidation of data from two studies at The Warren relating to an adaptation of the TRAPT for indoor spaces. The first study allowed the young people to design and predict their own environments and soundscapes, which included, for example, utilisation of the YouTube "Lofi Girl" channel; the second study confined the environmental design and soundscapes to meet a citywide maritime theme. Data from the studies is analysed to determine the importance of demographics on the perception of tranquillity, and to present concepts for extending the studies to capture a wider outdoor demographic.

Keywords: *tranquillity, TRAPT, indoor, soundscape, youth*

*Corresponding author: james.oatley@cirrusresearch.com

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1. INTRODUCTION

For many young people in Hull, The Warren is a place to come and feel empowered to make meaningful life decisions within a calm and open environment.

In 2022 Cirrus Research plc worked alongside The Warren to involve their young people on a journey of discovering tranquillity. The young people were educated on the meaning of tranquillity and given the freedom, with no preconceived notions of generally accepted forms of tranquillity, to come up with their own ideas of tranquil environments. As part of this journey Cirrus Research plc recorded sound pressure levels, analysed the visual elements of the environments, and worked with the young people to successfully adapt Bradford Universities TRAPT to allow tranquillity ratings to be predicted as a function of environmental features, [1-2].

In 2023 Cirrus Research plc were involved in further studies involving soundscapes at The Warren, this time based around the City of Hull's maritime initiative. The young people travelled around the city to record audible and visual snippets for soundscapes with mainly water-based themes. The soundscapes were adapted for indoor playback, and the young people were involved in determining the tranquillity of an indoor space with the new soundscapes, further expanding the TRAPT for indoor youth centres.

2. PROCESS

The TRAPT is an equation consisting of three variables, [2]:

1. *NCF* – the percentage of natural and contextual features occupying the space in question, typically deduced by taking a photo of the space and determining the percentage of natural and contextual features present.

2. LA_{eq} – recorded over the duration of analysis for a single environmental configuration.
3. MF – audible and visual moderating factors

Eqn. (1) represents the TRAPT, [2]:

$$(1) \quad TR = 9.68 + 0.041NCF - 0.146L_{Aeq} + MF \quad (1)$$

Solutions to the TRAPT have been deduced by, [1]:

1. Averaging the level of tranquillity felt by young people within an environment to obtain TR .
2. Recording LA_{eq} over the duration of analysis for a single environmental configuration.
3. Asking the young people a series of questions to deduce $NCFs$ and MFs for the environment.

Step (3) is then preceded by a data cleansing operation to consolidate responses under suitable observations of the environment. These observations are then categorised as $NCFs$, MFs , or *other* before the MFs are weighted according to number of mentions. Any observations mentioned only once, in a group of approximately 10 participants are treated as outliers and removed.

3. STUDY A – OPEN-ENDED SOUNDSCAPES

Study A followed the three-step solution process within a study centre, and a café area at The Warren, [1]. This process was followed by the young people considering and designing various soundscapes and visual cues to make the environment feel more tranquil to them. The impact of their changes was measured using the three-step process.

3.1 The Curve

The Curve is a study centre, and a hive of digital activity. It hosts classes on computer aided design (CAD), games design, artificial intelligence (AI) and other popular information technology (IT) skills, and gaming sessions.

Table 1. $NCFs$ for The Curve.

NCF	Divisive
Décor	No
Plants	No
Multimedia Systems	No

Table 1 presents the $NCFs$ identified for The Curve. Table 2 presents MFs deduced for The Curve calculated as per the process in Chapter 2. The positive impacts of space, office ambience with suitable soundscape and lighting can be observed.

Table 2. MFs for The Curve.

MF	Weight	Rule
Typing	1.5	N/A
Personal Space	2.0	N/A
Perspex Screens	-2.75	N/A
The Curve Soundscape	4	Use in audible isolation
Fractal Visuals & Ambient Lighting	1.5	N/A



Figure 1. Images of The Curve, The Warren, Hull.

3.2 The Snack Bar

The Snack Bar is a popular café area used for tea and coffee, socialising, and free hot meals. It is often busy and uses radio music for background ambience.

Table 3. $NCFs$ for The Snack Bar.

NCF	Divisive
Décor	Yes
Table Tennis Table	No

Table 3 presents the $NCFs$ identified for The Snack Bar; the décor was partially divisive.

Table 4. MFs for The Snack Bar.

MF	Weight	Rule
Radio Music	2.5	N/A
Friends	1	N/A
Favourites Playlist	2.5	Use in audible isolation

Lofi Girl (YouTube playlist)	3.5	Use in audible isolation
City Buildings Visuals & Ambient Lighting	0.25	N/A

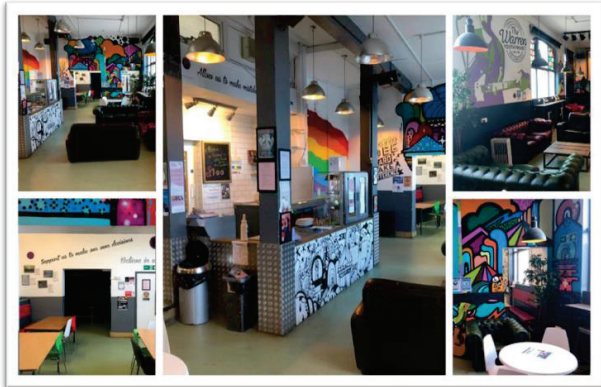


Figure 2. Images of The Snack Bar, The Warren, Hull

4. STUDY B – MARITIME AND ENVIRONMENTAL SOUNDSCAPES

Study B focussed the young people on Hulls maritime history, while aiming to expand the Study A dataset with other environmental themed audible and visual *MFs*. The study lasted one day in The Curve where the young people were questioned on the different soundscapes and visual effects following the same three step process as before. This study differed from Study A whereby the visual elements introduced formed new *NCFs*, providing visual context to the existing soundscapes, unlike Study A where the visual elements were additional non-contextual *MFs*.

4.1 The Curve

The young people were asked to focus on a single section of the Curve to experience the soundscapes in full.

Table 5. *NCFs* for The Curve.

NCF	Divisive
Multimedia Systems	No
Décor	No
Plants	No
Sea Waves in Visual	No
Seagulls in Visual	No

Projected Imagery	No
Vehicles in Visual	No
Fountain in Visual	Yes
Humber Bridge in Visual	Yes
Daylight in Visual	No
Boats in Visual	No
Birds in Visual	No
Rain in Visual	No
Historic Town in Visual	No
Park in Visual	No
Old Buildings in Visual	No
Bright Lighting	No

Table 5 presents *NCFs*, for this study the fountain and Humber bridge visuals were not treated as *NCFs* as they emotionally divided the group.

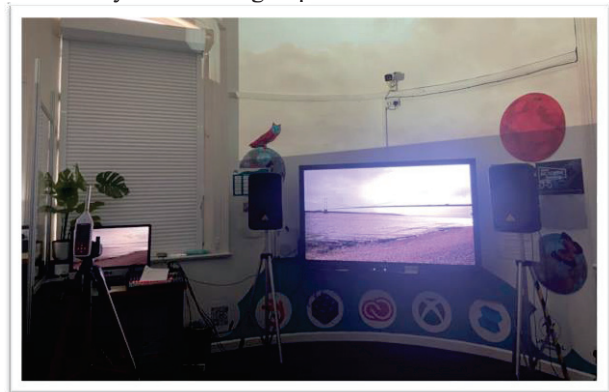


Figure 3. Image of The Curve, The Warren, Hull

Table 6. *MFs* for The Curve within Study B.

MF	Weight	Rule
Fountain Audible	4.25	Use in audible isolation
Birds Audible	4	N/A
Waves Audible	3.5	N/A
Lofi Girl	3.5	N/A
Ambient Lighting	3	N/A
Seagulls Audible	2.75	N/A
Rain Audible	2.75	Use in audible isolation
Personal Space / Booths	2	N/A

Marina Water Audible	1.75	Use in audible isolation
Typing / Clicking	1.5	N/A
Rustling Trees Audible	1.5	Use with visual context
Boats Clanking Audible	1.5	N/A
Friends	1	N/A
Vehicles Audible	-1.75	N/A
Non-Contextual Water Audible	-1.75	Does not include rain
Bright Visual	-2.25	N/A
Perspex Screens	-2.75	N/A

Table 6 presents *MFs* identified within The Curve. The *MFs* were solved using the existing known data from Study A in combination with new data.

5. DISCUSSION

The results of Study A serve to validate the concept of using the TRAPT indoors, [1]. They provide a useful tool in understanding how young people approach creating their own tranquillity. Young people prefer productive peaceful environments, with their friends in sight, they feel calm when listening to Lofi Girl on YouTube, and appreciate bold wall art, low lighting, and digital visuals.

Study B incorporates some of the more traditionally accepted forms of tranquillity into the young people's lives where, with a few caveats, they were accepted.

5.1 Warning on Continuous Noise

Due to the maritime focus of Study B, many of the soundscapes contained continuous water noises. This study found that continuous water noises were only impactful as *MFs* when used in audible isolation; possibly because the non-continuous *MFs* act as a psychoacoustic distraction.

5.2 Importance of Divisiveness

Divisive *NCFs* were suitably marked, to ensure they were not lost within the context of the TRAPT. The TRAPT can easily mask the impact of divisive elements as its result represents only a mean approximation of perceived tranquillity for any given environment.

Within Study A, and for parts of Study B, the *NCFs* and *MFs* were mostly non-divisive, with, on many occasions, only one participant perceiving the opposite of the majority. However, the Fountain and Humber Bridge *NCFs* invoked

negative memories and emotions for more than one member of the group within Study B. Study B accounted for this by excluding such visuals from the percentage of *NCFs* used within the equation.

5.3 Applicability of Conventionally Accepted Tranquil Elements

While Study A was successful in bringing the TRAPT in doors, Study B was successful in understanding how young people perceive more conventional forms of tranquillity.

The study revealed that, while young people experience tranquillity through modern music and digital visuals, they can also experience tranquillity through birdsong, maritime-themes, and rustling trees.

It must be noted that bringing water noises indoors applies a *MF* of -1.75 with a lack of appropriate context, and the benefit of rustling trees was only applicable with a visual context. Such penalties did not present themselves with the sound of rain.

6. CONCLUSIONS AND NEXT STEPS

The combination of studies A and B reveals that young people experience tranquillity indoors through both their own concepts of tranquillity, and the more widely accepted traditional forms of tranquillity, such as birdsong, and blue-infrastructure themed environments. Relationships between various *MFs* have been established to aid the user in determining suitability of indoor features for tranquil environments.

The TRAPT has been provided with enough parameters to be taken to new youth centres around the UK for further validation. Furthermore, the young people of The Warren should find themselves well equipped to share their understanding of tranquillity with a wider demographic outdoors as part of Hull Yorkshire's Maritime City Project.

7. REFERENCES

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