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Preliminary results of the Soundscape Attributes Translation Project (SATP): lessons learned and next steps

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ABSTRACT

The ISO/TS 12913-2:2018 document for soundscape data collection provides a questionnaire instrument for researchers and practitioners to use worldwide, but its applicability has been questioned, since it's only available in English. To address the lack of research on translations of the soundscape descriptors proposed in Method A of the ISO technical specifications (i.e., vibrant, pleasant, calm, uneventful, monotonous, annoying, chaotic, eventful), an international collaboration, the Soundscape Attributes Translation Project (SATP), was initiated to translate the descriptors into several languages, using different methodological approaches, with the goal of validating the translations using standardized listening experiments. This paper presents the current state of advancement of the project, reporting on preliminary results from selected national working groups within the SATP network, as well as discussing the proposed analysis framework to validate the translations.

Keywords: *ISO 12913, soundscape descriptors, translations, listening experiments, CFA.*

1. INTRODUCTION

The measurement of people's responses to acoustic environments, also known as soundscape assessment, is a challenging task that researchers and other stakeholders have been working on for the past 15-20 years. The International Organization for Standardization (ISO) formed a working group in 2008 to support harmonization in soundscape theory and methodological approaches, leading to the publication of three parts of the ISO 12913 series on soundscape. The ISO/TS 12913-2:2018 is particularly important as it deals with the more methodological aspects of a soundscape study, providing protocols for data collection of individual responses to acoustic environments [1]. The attributes and semantic scales that form the questionnaire proposed in Method A of the technical specifications –i.e., vibrant, pleasant, calm, uneventful, monotonous, annoying, chaotic, eventful– are mainly from soundscape literature [2]. However, the instrument is only available in English. The translation of soundscape descriptors into other languages is a topic of ongoing debate within the soundscape community and previous research has identified concerns in adapting the English version of such perceptual attributes for other regions.

The Soundscape Attributes Translation Project (SATP) is an international network of soundscape researchers from different regions of the world that was formed to address this gap [3]. The main aims of the SATP initiative are:

- To provide validated translations for the soundscape descriptors proposed in Method A (vibrant, pleasant, calm, uneventful, monotonous, annoying, chaotic, eventful) of the ISO/TS 12913-2 for an initial set of languages.
- To provide materials and a robust method for validating languages that may be considered for addition in the future.

This paper describes the current progress of the SATP initiative and summarizes the main findings of the first scientific outputs emerging from the project. Furthermore, the paper describes the proposed framework of analysis/validation of the translations of the protocol and discusses the next stages of development of the project. The languages currently considered within the SATP initiative are: Albanian, Arabic, Chinese, Croatian, Dutch, English, French, German, Greek, Indonesian, Italian, Japanese, Korean, Malay, Portuguese, Spanish, Swedish, Thai, Turkish, and Vietnamese – locations of the Working Groups are reported in Figure 1.

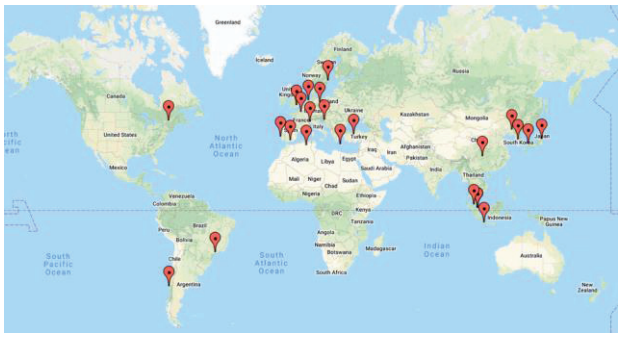

Figure 1. Research groups currently active within the SATP.

2. SATP DATASET

The SATP dataset is available on Zenodo [4]. It consists of twenty-seven 30-second binaural audio recordings made in urban public spaces in London and one 60-second stereo

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calibration signal. The recordings were made by an operator wearing a binaural kit consisting of BHS II microphones and a SQobold device and were exported to WAV via the ArtemiS SUITE software. The listening experiment and the calibration procedure were intended for a headphone playback system. The recordings were selected from an initial set of 80 recordings through a pilot study to ensure the test set had an even coverage of the soundscape circumplex space. The current SATP Dataset (v1.2) contains 17,441 samples, including 645 participants, for 27 recordings, in 19 languages with contributions from 29 institutions. This is the result of the efforts of the different research groups around the world who ran the listening experiment using the agreed set of SATP audio stimuli, but using the local version of the eight soundscape perceptual attributes of the ISO questionnaire in the country-specific language.

The audio recordings are provided by the UCL IEDE Acoustics Group as 24-bit, 48 kHz, stereo WAV files, and the combined dataset and Institutional datasets are provided as long tidy data tables in .xlsx files. All SATP recordings are provided under the Creative Commons Attribution 4.0 International (CC BY 4.0) License.

The dataset can also be used in the `soundscapy` application, for data analysis and visualization [5]. For instance, Figure 2 shows the mean scores of the English participants, with the 27 audio stimuli used in the SATP listening experiment [3], plotted on the ISO Circumplex space as ISOPleasant-ISOEventful coordinates [6].

3. ANALYSIS FRAMEWORK

The Technical Specifications of Part 3 of the ISO 12913 series [6] and subsequent scientific literature (see e.g., [5]) suggest the "projection method" as analysis method, which strictly assume an underlying orthogonal relationship between the two main dimensions of pleasantness and eventfulness. To test this, in the context of the SATP, the project will rely on a version of SEM specifically developed for probing circumplex structures.

The SATP aims to verify whether the factors of the soundscape 'circumplex' conform to a circumplex, quasi-circumplex, or circular model and how accurately standard model fit tests would identify satisfactory translations of the attributes used for each factor/dimension. Answering such questions will be helpful to determine what correction method (if any) would have to be applied to soundscape attributes in different languages.

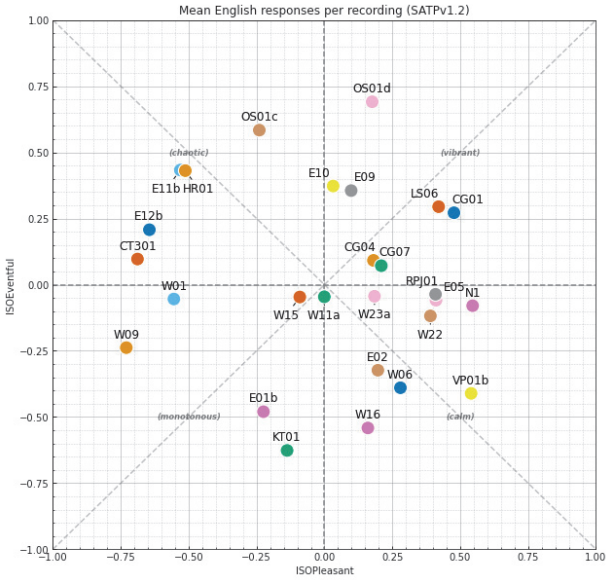

Figure 2. Mean scores of the participants for the English SATP listening experiment, plotted on the ISO Circumplex space.

4. OUTPUTS OF THE SATP NETWORK

In order to maximize the impact of the SATP results, a Special Issue was launched in the journal Applied Acoustics (ELSEVIER) to gather publications from SATP partners (https://www.sciencedirect.com/journal/applied-acoustics/about/call-for-papers#soundscape-attributes-translation-current-projects-and-challenges). In this section we summarize the main outputs of the research activities published so far, either in the Applied Acoustics special issue or in other journals and/or conference proceedings. The publications below, mostly cover the first stage of the SATP initiative, namely the preliminary research activities that led to the local translations of the protocol before the listening experiments, or some further country-specific analyses that are reported in more detail for the benefit of local academic communities.

4.1 Papadakis, *et al.* (2022)

The Greek and English SATP Working Groups [7] focused on the aspect of translation and cross-cultural adaptation (CCA) in soundscape research. An approach based on a combined technique of forward translation, synthesis, back translation, pre-test, and a committee approach, was selected. The methodology was applied to the Greek translation of ISO/TS 12913–2:2018 attributes and

validated through listening tests and principal component analysis (PCA). The study found that translation errors may be misinterpreted as cross-cultural differences without proper application of a translation methodology and that PCA can be used as a validation methodology for comparison of different translations.

4.2 Lam, *et al.* (2022)

The Malay Working Group [8] examined how cultural and language education differences between Singapore and Malaysia can affect the affective appraisal of soundscapes. A binational expert-led approach and quantitative evaluation framework were used to generate provisional translations of the eight soundscape attributes in Bahasa Melayu. Results from a cross-national evaluation of 66 participants found that only the translation of "annoying" had significant differences between Singapore and Malaysia.

4.3 Watcharasupat, *et al.* (2022)

The Thai Working Group [9] proposed a method for evaluating the quality of translations of soundscape attributes based on the circumplex model of soundscape perception. The method involved establishing criteria for evaluating the linguistic and psychometric properties of translation candidates (i.e., different possible translation items for the same soundscape descriptor) and performing statistical analyses to objectively assess their strengths and weaknesses. The method was demonstrated in an English-to-Thai translation of soundscape attributes and revealed acoustic and psycholinguistic properties of the translation candidates that were not previously identified by an expert panel.

4.4 Sudarsono, *et al.* (2021)

The Indonesian Working Group [10] reported on the development of soundscape perceptual attributes in Indonesian, using focus group discussions and in situ experiments to identify soundscape evaluations using both English and Indonesian attributes. Results of the analysis using the Wilkinson signed-rank test show that the rating score between English and Indonesian attributes is not significant for certain attributes, but there are differences in ratings for other attributes. The study suggests that using English attributes or direct translations may not be suitable for soundscape studies in Indonesia.

4.5 Antunes, *et al.* (2018)

The Portuguese Working Group [11] described in a conference paper the work done for Stage 1 [3] of the SATP for the Portuguese language, which aimed to translate the eight soundscape attributes from English to Portuguese. The research group included representation for Europe and South America, but future research could include other countries where Portuguese is spoken (e.g., in Africa or Asia). Results indicate that two words/attributes were chosen as translations for the majority of respondents, except for one attribute, "caótico" (chaotic), for which no second word was selected due to lack of statistical evidence.

4.6 Moshona, *et al.* (2023)

Two translation strategies were compared by the the German Working Group [12]: one that maximized circumplexity and one that aimed for language invariance. Results showed that the first strategy had better results, but the second strategy was more suitable for unbiased cross-cultural comparisons. According to the authors, this paradoxical finding was due to a lack of empirical circumplexity of the English original, which raised the point on whether even the current ISO protocol (in English) should be questioned and/or revisited.

5. CONCLUDING REMARKS

The research activities of the current SATP network are still in progress and the network itself is evolving by acquiring new partners and establishing new Working Groups in other languages. The impact of the initiative is going beyond the soundscape community and is triggering a broader reflection about translation issues in noise and soundscape studies [13] and even how we effectively communicate soundscape constructs using tools that go "beyond" languages [14].

One of the key contributions of the SATP initiative, is making its datasets and calibration and experiment protocols available for future research and development towards other languages [3,4,15]. Overall, the SATP initiative is an attempt to standardize soundscape data collection protocols in different languages. Twenty languages are actively being worked on, at the moment, potentially covering a large portion of the global population. The project welcomes collaborators in other regions and hopes to support the widespread adoption of soundscape descriptors in academia and practice. The relationship between language and senses is complex and more research is needed to understand it. A collaborative effort with expert linguists is also necessary to standardize language

comparison, while respecting each language's unique characteristics. This will also support the exploration of possible cultural differences in the appreciation of urban soundscapes, and ultimately inform the inclusion of such factors in soundscape evaluation models [16].

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