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Advancing cross-cultural soundscape research: updates from the Soundscape Attributes Translation Project (SATP)

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ABSTRACT

The Soundscape Attributes Translation Project (SATP) addresses linguistic barriers in soundscape research, translating ISO/TS 12913-2:2018 descriptors into various languages for global use. This paper presents recent updates from national working groups, including translations in Turkish, French, Indonesian, Albanian, Chinese, Japanese, Vietnamese, Dutch, and Spanish. A preliminary validation of all the current 18 SATP translations assesses cross-cultural robustness. SATP employs diverse methods for translation, fostering international collaboration. The preliminary validation evaluates the reliability and validity of translated descriptors across languages. Most languages maintain the quasi-circumplex structure of the original soundscape model. English, Arabic, Chinese (Mandarin), Croatian, Dutch, German, Greek, Indonesian, Italian, Spanish, Swedish, and Turkish achieve a "High" confidence level. French, Japanese, Korean, Malay, Portuguese, and Vietnamese show varying confidence levels, emphasizing the need for rigorous validation criteria. SATP advances global soundscape research, with updates from national working groups contributing to cross-cultural relevance. Preliminary validation results affirm the quasi-circumplex structure's maintenance in most languages, emphasizing the project's commitment to comprehensive and globally applicable soundscape research instruments.

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1. INTRODUCTION

Soundscape studies have attracted increasing attention in recent years for their relevance in various domains ranging from urban planning to psychological well-being [1,2]. However, amidst this expanding awareness about the importance of the soundscape approach, linguistic barriers have posed significant challenges to the comprehensive understanding and cross-cultural applicability of soundscape research. Addressing this critical gap, the Soundscape Attributes Translation Project (SATP) emerges as a pioneering initiative aimed at overcoming linguistic boundaries in soundscape studies [3]. The SATP acknowledges that the richness and complexity of soundscape research cannot be fully realized without accommodating diverse linguistic and cultural perspectives [4]. Building upon the conclusions of the most recent SATP update [5], this paper presents recent progress from other SATP national working groups made in translating ISO/TS 12913-2:2018 descriptors into additional languages.

2. RECENT OUTPUTS OF THE SATP NETWORK

In this section, an overview of the SATP scientific outcomes published thus far is provided, appearing in a dedicated Applied Acoustics (ELSEVIER) special issue. These publications focus either on the initial phase of the SATP initiative, which involves preliminary research activities leading to the localization of the protocol prior to the commencement of listening experiments, or to analysis on datasets collected during the SATP listening experiments.

2.1. Dökmeci Yörükoğlu, et al. (2023)

This study [6] aimed to establish Turkish equivalents for ISO soundscape attributes, assess their conceptual equivalence, and evaluate the Turkish scale's reliability. Through focus groups and expert consultation, translations were finalized for attributes such as 'eventful', 'vibrant', 'pleasant', 'calm', 'uneventful', 'monotonous', 'annoying', and 'chaotic'. The Turkish scale demonstrated high reliability, with some differences noted in conceptual equivalence, particularly for 'vibrant' and 'chaotic'. However, when reduced to two dimensions—pleasantness and eventfulness—the English and Turkish scales showed high correlation.

2.2. Tarlao, et al. (2023)

The French SATP working group examined the French translations of the Perceived Affective Quality Scales outlined in ISO/TS 12913–2 [7], focusing on differences observed in various contexts over the past two decades. Insights from research teams in Quebec and France revealed challenges in stabilizing attributes. An analysis of responses from 34 Quebec participants supplemented these insights. Overall, both Quebec and French translations largely aligned in terms used and issues raised. Recommendations are provided to address complexities in soundscape experiences and explore additional attributes, dimensions, and methods to enhance the Perceived Affective Quality Scales.

2.3. Sudarsono, et al. (2024)

The Indonesian SATP working group carried out soundwalks to validate attributes in both Indonesian and English [8]. Through Principal Component Analysis (PCA), Multidimensional Scaling (MDS), Reliability Analysis, and Confirmatory Factor Analysis (CFA), it was found that implementing Indonesian attributes yields results closer to the standard circumplex model than using English attributes. However, further analysis suggested the need for adjustments to the circumplex model. The model developed using CFA with Indonesian attributes demonstrated slight differences in pleasantness and eventfulness scores compared to the standard ISO 12913-3 model.

2.4. Fasllija, et al. (2024)

The Albanian SATP working group explored noise pollution legislation in Albania and aimed to develop Albanian equivalents of soundscape descriptors outlined in ISO/TS 12913-2:2018 [9]. Following SATP guidelines, a mixed-method approach was employed, involving qualitative investigation and quantitative evaluation. Linguistic and acoustic experts translated affective attributes, which were later evaluated by Albanian participants proficient in English. Criteria such as Appropriateness, Understandability, and Clarity were considered. Final translations were determined through statistical analysis. Despite limitations, eight validated Albanian attribute translations were established, indicating potential for further research, including listening experiments. These findings offer promising insights into addressing soundscape descriptors in Albanian contexts.

2.5. Li, et al. (2023)

The Chinese (Mandarin) SATP working group explored a protocol for Mandarin Chinese soundscape characterization through cross-referencing two independent expert panels [10]. Ex situ auditory-only experiments conducted in UK urban open spaces with the 27 SATP recordings evaluate participants' experiences using the ISO scales. Results are projected into pleasantness and eventfulness dimensions following ISO/TS 12913-3:2019 protocols. Principal component analysis revealed the salience of sound sources and their impact on perception. Regression analysis identifies factors affecting pleasantness and eventfulness, with birdsong positively affecting pleasantness and mechanical sounds negatively impacting eventfulness. Certain sound sources enhanced foreground perception, while others contribute through acoustic characteristics, emphasizing their nuanced roles in soundscape perception.

2.6. Nagahata (2023)

The Japanese SATP working group discussed the selection process for Japanese-translated words representing perceived affective quality attributes of soundscape in ISO/TS 12913–2:2018 [11]. Results revealed that the scale seems to inaccurately categorize "eventfulness" as an affective quality rather than a cognitive attribute. Moreover, this study challenged the application of the circumplex model of affect in ISO/TS 12913–3. Consequently, it questioned the accuracy of calculating pleasantness and eventfulness using ISO/TS 12913–3, suggesting revisions for both ISO/TS 12913–2 and ISO/TS 12913–3. Ultimately, the paper proposed a Japanese-translated version of the perceived affective quality scale for soundscape studies, highlighting the need for improved standards in the field.

2.7. Nguyen, et al. (2023)

The Vietnamese and Japanese SATP working groups further joined efforts to explore the translation and application of Vietnamese and Japanese attributes within the SATP standardized listening experiments to assess sound environments in Vietnam and Japan [12]. Divided into two parts, the study first examined the subjective evaluations of the 27 SATP binaural recordings by Vietnamese and Japanese participants. Secondly, it surveyed perceptions of sound environments in public spaces in both countries using the standardized attributes and scales. The research methodology included analyzing physical indices of each soundscape context and subjective evaluations. Cultural differences in soundscape evaluations between Japanese and Vietnamese were revealed, potentially influencing residents' perception of soundscapes and offering insights for culturally-aligned soundscape designs.

2.8. van den Bosch, et al. (2023)

The study by the Dutch SATP working group [13] validated Dutch translations of soundscape descriptors. Seven expert researchers from the Netherlands and Belgium translated eight English attributes into Dutch. Subsequently, 32 Dutch participants rated the 27 SATP audio files

on these attributes. Results suggest that Dutch translations were applied similarly to the original English attributes, with a slight bias towards Pleasantness and Eventfulness. Bayesian analysis indicated less fitting translations for the attributes “uneventful” and “annoying”. While further research is needed, findings suggest Dutch translations could be useful for describing general soundscape appraisals in the Netherlands, though not perfect.

2.9. Vida, et al. (2023)

The Spanish SATP working group [14] compared the Spanish translation of the ISO soundscape circumplex model with the original English version, using the Structural Summary Method (SSM) for analysis. Findings revealed reasonable accordance in listening experiments by native English and Spanish speakers but highlighted the need to revise dimensions like “vibrant/monotonous” and “eventful/uneventful” to align with population interpretation. These revisions would enhance the Spanish translation and prompt questions about the adequacy of the original English formulation. Cultural differences in dimension meanings are underscored, alongside challenges in objectifying the soundscape circumplex model within the ISO 12913 framework.

3. CURRENT STATE OF SOUNDSCAPE ATTRIBUTES TRANSLATIONS VALIDATIONS

The SATP network is currently working on developing an assessment framework and validation protocol of the 8 original soundscape attributes from the ISO/TS 12913-2:2018 “Method A” instrument, which form the original soundscape circumplex model proposed by Axelsson and colleagues [15]; namely: pleasant, vibrant, eventful, chaotic, annoying, monotonous, uneventful, calm. This is based on a four-step procedure described in Ref. [16].

The translated soundscape descriptors across various languages reveal nuanced differences in their performance, emphasizing the significance of adjusted angles (compared to the orthogonal dimensions of pleasantness and eventfulness and the 45-degree rotation of the derived constructs) in ensuring the reliability of the quasi-circumplex structure. Notably, the English descriptors, serving as a reference, demonstrate precise allocations with specific adjusted angles for each soundscape attribute. Among the languages assessed so far, those achieving “High” confidence after the application of adjusted angles include Arabic, Chinese (Mandarin), Croatian, Dutch, English, German, Greek, Indonesian, Italian, Korean, Spanish, Swedish, and Turkish [16]. These languages consistently maintain the quasi-circumplex structure, suggesting a robust cross-cultural validity [17]. Conversely, French, Japanese, Malay, Portuguese, and Vietnamese exhibit either “Medium” or “Low” confidence levels, as they fail to meet the criteria for the first two steps of the validation methodology, and therefore applying adjusted angles is either not feasible at all, or not recommended. Both the French and Japanese SATP working groups had considered different sets of attributes for some of the items, so it is possible that different versions of the translated protocols may yield higher level of confidence after angles adjustment [7,11].

4. CONCLUSIONS

The Soundscape Attributes Translation Project (SATP) stands as an important initiative in advancing cross-cultural soundscape research, addressing linguistic barriers to ensure global applicability and relevance, which is a need that has been previously brought up in scientific literature [18]. The recent updates from national working groups underscore the project’s commitment to fostering international collaboration and enhancing the comprehensiveness of soundscape research instruments. The translations of ISO/TS 12913-2:2018 descriptors into various languages represent a significant milestone in facilitating cross-cultural understanding and exploration of sound environments. The preliminary validation of these translations reveals promising results, with most languages maintaining the quasi-circumplex structure and demonstrating robust cross-cultural validity.

Moving forward, the SATP will continue to refine its validation protocol and assessment framework to ensure the reliability and cross-cultural validity of translated soundscape descriptors. By promoting collaboration among international research teams and addressing linguistic barriers, the project seeks to advance global soundscape research and foster a deeper appreciation of sound environments worldwide. As the SATP further explores the complex interplay between language, culture, and sensory perception, it becomes increasingly evident that a collaborative effort with expert linguists is necessary for standardizing language comparison while respecting the unique characteristics of each language. The insights gleaned from this endeavor not only pave the way for a more comprehensive understanding of the relationship between language and senses but also hold profound implications for the evaluation and appreciation of urban soundscapes on a global scale.

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REFERENCES

1. Kang, J., Aletta, F., Gjestland, T. T., Brown, L. A., Botteldooren, D., Schulte-Fortkamp, B., ... & Lavia, L. (2016). Ten questions on the soundscapes of the built environment. *Building and Environment*, ***108***, 284-294.
2. Aletta, F., Oberman, T., & Kang, J. (2018). Associations between positive health-related effects and soundscapes perceptual constructs: A systematic review. *International Journal of Environmental Research and Public Health*, ***15*****(11)**, 2392.
3. Aletta, F., Oberman, T., Axelsson, Ö., Xie, H., Zhang, Y., Lau, S. K., ... & Kang, J. (2020, October). Soundscape assessment: Towards a validated translation of perceptual attributes in different languages. In *Inter-noise and noise-con congress and conference proceedings* (Vol. 261, No. 3, pp. 3137-3146). Institute of Noise Control Engineering.
4. Papadakis, N. M., Aletta, F., Kang, J., Oberman, T., Mitchell, A., & Stavroulakis, G. E. (2022). Translation and cross-cultural adaptation methodology for soundscape attributes–A study with independent translation groups from English to Greek. *Applied Acoustics*, ***200***, 109031.
5. Aletta, F., Oberman, T., Mitchell, A., Kang, J., & SATP*. (2023). Preliminary results of the Soundscape Attributes Translation Project (SATP): lessons learned and next steps.

Proceedings of Forum Acusticum (pp. 701-705). Turin: European Acoustics Association. https://www.doi.org/10.61782/fa.2023.0095

6. Dökmeci Yörükoğlu, P. N., Türker Bayrak, Ö., Akbulut Çoban, N., Erçakmak Osma, U. B., Aletta, F., Oberman, T., . . . Kang, J. (2023). Translation of soundscape perceptual attributes from English to Turkish. *Applied Acoustics,* ***209***, 109391. https://doi.org/10.1016/j.apacoust.2023.109391
7. Tarlao, C., Aumond, P., Lavandier, C., & Guastavino, C. (2023). Converging towards a French translation of soundscape attributes: Insights from Quebec and France. *Applied Acoustics*, ***211***, 109572. https://doi.org/10.1016/j.apacoust.2023.109572
8. Sudarsono, A. S., Sarwono, S. J., Nitidara, N. P. A., & Hidayah, N. (2024). The implementation of soundscape attributes in Indonesian: A case study of soundwalk. *Applied Acoustics*, ***216***, 109786. https://doi.org/10.1016/j.apacoust.2023.109786
9. Fasllija, E., Shtrepi, L., & Alimadhi, E. (2024). Development of the Albanian translation of the Perceived Affective Qualities in the ISO/TS 12913-2 soundscape standard. *Applied Acoustics*, ***217*,** 109835. https://doi.org/10.1016/j.apacoust.2023.109835
10. Li, M., Han, R., Xie, H., Zhang, R., Guo, H., Zhang, Y., & Kang, J. (2023). Mandarin Chinese translation of the ISO-12913 soundscape attributes to investigate the mechanism of soundscape perception in urban open spaces. *Applied Acoustics*, ***215***, 109728. https://doi.org/10.1016/j.apacoust.2023.109728
11. Nagahata, K. (2023). A trial of translation of the perceived affective quality attributes for soundscape research to Japanese. *Applied Acoustics*, ***211***, 109542. https://doi.org/10.1016/j.apacoust.2023.109542
12. Nguyen, T., Nagahata, K., Morinaga, M., & Ma, H. (2023). Cross-cultural comparison of soundscape evaluation between Japanese and Vietnamese using standardized attributes. *Applied Acoustics*, ***213***, 109627. https://doi.org/10.1016/j.apacoust.2023.109627
13. van den Bosch, K. A., Fitzpatrick, D. W., Lühr, T. C., Orlik, N. B., & Sarampalis, A. (2023). Creating a common language for soundscape research: Translation and validation of Dutch soundscape attributes. *Applied Acoustics*, ***212***, 109545. https://doi.org/10.1016/j.apacoust.2023.109545
14. Vida, J., Almagro, J. A., García-Quesada, R., Aletta, F., Oberman, T., Mitchell, A., & Kang, J. (2023). Soundscape attributes in Spanish: A comparison with the English version of the protocol proposed in Method A of the ISO/TS 12913–2. *Applied Acoustics*, ***211***, 109516. https://doi.org/10.1016/j.apacoust.2023.109516
15. Axelsson, Ö., Nilsson, M. E., & Berglund, B. (2010). A principal components model of soundscape perception. *The Journal of the Acoustical Society of America*, ***128*****(5)**, 2836-2846.
16. Mitchell, A., & Aletta, F. (2023, December 20). Testing and adjusting soundscape circumplex translations. https://doi.org/10.17605/OSF.IO/JVNA2
17. Aletta, F., Oberman, T., Mitchell, A., Erfanian, M., & Kang, J. (2023). Soundscape experience of public spaces in different world regions: A comparison between the European and Chinese contexts via a large-scale on-site survey. *The Journal of the Acoustical Society of America*, ***154*****(3)**, 1710-1734.
18. Aletta, F., Xiao, J., & Kang, J. (2024). Identifying barriers to engage with soundscape standards: Insights from national standards bodies and experts. *JASA Express Letters,* ***4*****(4)**, 047401.