Crossing the Linguistic Causeway: A Binational Approach for Translating Soundscape Attributes to Bahasa Melayu

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\textbf{ARTICLE INFO}

| Keywords                                    | ABSTRACT                                                                 |
|--------------------------------------------|--------------------------------------------------------------------------|
| Soundscape                                  | Translation of perceptual descriptors such as the perceived affective quality attributes in the soundscape standard (ISO/TS 12913-2:2018) is an inherently intricate task, especially if the target language is used in multiple countries. Despite geographical proximity and a shared language of Bahasa Melayu (Standard Malay), differences in culture and language education policies between Singapore and Malaysia could invoke peculiarities in the affective appraisal of sounds. To generate provisional translations of the eight perceived affective attributes — eventful, vibrant, pleasant, calm, uneventful, monotonous, annoying, and chaotic — into Bahasa Melayu that is applicable in both Singapore and Malaysia, a binational expert-led approach supplemented by a quantitative evaluation framework was adopted. A set of preliminary translation candidates were developed via a four-stage process, firstly by a qualified translator, which was then vetted by linguists experts, followed by examination via an experiential evaluation, and finally reviewed by the core research team. A total of 66 participants were then recruited cross-nationally to quantitatively evaluate the preliminary translation candidates. Of the eight attributes, cross-national differences were observed only in the translation of annoying. For instance, menjengekelkan was found to be significantly less understood in Singapore than in Malaysia, as well as less understandable than membingitkan within Singapore. Results of the quantitative evaluation also revealed the imperfect nature of foreign language translations for perceptual descriptors, which suggests a possibility for exploring corrective measures. |
| Translation                                 |                                                                           |
| Psychoacoustics                             |                                                                           |
| Bahasa Melayu                               |                                                                           |
| Circumplex                                  |                                                                           |

\textbf{1. Introduction}

The Standard Malay (ISO 639-3: ZSM), or Bahasa Melayu, is the national language of Malaysia, Singapore, and Brunei. For Malaysia and Brunei, it is also the sole official language, while it is one of the four official languages of Singapore together with English, Mandarin Chinese, and Tamil. In Brunei, however, Brunei Malay (Bahasa Melayu Brunei; ISO 639-3: KXD) is more commonly used as the lingua franca than the Standard Malay (McLellan et al., 2016). For consistency and brevity, specific language varieties will henceforth be referenced by their ISO 639-3 language code, i.e. ZSM for Bahasa Melayu. Geographically, Singapore is located south of Peninsular Malaysia, connected by two short land bridges, the Johor–Singapore Causeway and the Singapore–Singapore Second Link. Although Malaysia and Singapore have a significant shared history as well as close cultural and linguistic ties to each other, each country has developed separate national identities and cultures. Moreover, both countries have distinct language policies. In Singapore, English is the lingua franca and the official working language for government and business. Since 1987, Singapore has adopted a bilingual policy where English is offered as the “first” language and “mother tongue” as a “second” language in all Singapore schools (Alfred and Tan, 1987). Despite the dominance of English, proficiency in ZSM is still relatively high at approximately 90% across all age groups within the Malay ethnic community in Singapore (Mathews et al., 2020). In Malaysia, ZSM is widely used in education, governmental matters and industries along with frequent use of other languages such as English, Chinese, or Tamil among the bilingual or multilingual community. The importance and prevalence of ZSM prevail as a national symbol of unity and identity. As such, intercultural variations in the acoustico-psychometric properties of the ZSM translations may exist across the two populations.

In fact, the issue of intercultural acoustico-psychometric differences is not unique to ZSM — translation of psychometric terms into any language that is substantially used in more than one cultural and/or ethnic groups may require investigation to ensure intercultural validity. An example of one such language is Portuguese, an official language of ten countries with a combined population of 270 million people. In Antunes et al. (2021), a bicultural assessment of soundscape attribute translations into Portuguese was performed.
in Brazil and Portugal, where differences in suitability were observed for secondary translations of chaotic.

Within the Malay language family (Macrolanguage ISO 639-3: MSA), another standardized variety called Bahasa Indonesia (ISO 639-3: IND) is also used as an official language in Indonesia. Despite mutual intelligibility with ZSM, there exist significant linguistic and cultural differences in the use of the two Bahasa varieties. As such, the translation process of soundscape attributes to IND is considered separately from that of ZSM (see Sudarsono et al., 2021).

This work describes “Stage 1” of the Soundscape Attributes Translation Project (SATP) (Aletta et al., 2020), whereby 8 perceived affective quality (PAQ) attributes in “Method A” of ISO/TS 12913-2:2018 (ISO, 2018) were translated to ZSM. The translation of the PAQ attributes (eventful, vibrant, pleasant, calm, uneventful, monotonous, annoying, and chaotic) follows a similar process as the Portuguese and Thai translations, whereby a set of preliminary translations were first generated via an expert-led procedure. This is followed by a quantitative evaluation framework introduced in Watcharasupat et al. (2022) to evaluate and identify the most suitable provisional translation(s) for each PAQ attribute. The cross-national differences between the Singaporean and Malaysian populations of the expert-led preliminary (zsm) translations were examined statistically. Essentially, this paper identifies (1) whether there are cross-national differences in ZSM translations of the PAQ attributes between Singapore and Malaysia, and (2) potential deviations from the implied circumplicity of the PAQ attributes.

The remainder of the paper is organized as follows. The data collection method, participant demographics, the quantitative evaluation methodology, and the data analysis approach are described in Section 2. The process of obtaining the preliminary translations is detailed in Section 3. Analysis of the quantitative evaluation is described in Section 4. Section 5 discusses the implications of the analysis; and Section 6 concludes the paper. For brevity, Singapore and Malaysia would henceforth be written in shorthands as SG and MY. ISO 639-3: ENG and ISO 639-3: ZSM would be shortened to ENG and ZSM, respectively.

2. Methods

In Stage 1 of the SATP initiative, the eight perceived affective quality attributes were to be independently translated to the native languages of the registered working groups, without restriction on the translation methodologies (Aletta et al., 2020). The methodology employed for SATP Stage 1 translations to Bahasa Melayu is thus detailed in this section.

2.1. Data collection method

The process of deriving the final translations from English to Bahasa Melayu was divided into five substages: (1a) an initial translation, (1b) focus group discussion, (1c) experiential evaluation, (1d) committee review, and (1e) a quantitative evaluation, as summarised in Table 1. These substages are team-based method triangulation used in seeking corroboration in the translations, which resembles the team-based Translation, Review, Adjudication, Pre-testing and Documentation (TRAPD) framework (Harkness, 2008; Mohler et al., 2016).

In Stage 1a, an initial semantic translation was formulated by a qualified translator in Singapore, who is natively and bilingually proficient in English and Bahasa Melayu. The entire Method A questionnaire in ISO/TS 12913-2 (ISO, 2018) was translated to Bahasa Melayu with special emphasis on providing alternative translations to the eight PAQ attributes, as shown in Section Appendix B. This is followed by a focus group discussion (FGD) led by a soundscape researcher from Universiti Putra Malaysia (UPM) together with three UPM linguistics academics to assess the cross-cultural accuracy and comprehension of the Singapore-based Stage 1a translations (Stage 1b).

The Stage 1b exploratory translations from the focus group discussion (FGD) were used in the experiential in-situ evaluation with four non-linguistic UPM academics from non-acoustic fields with native bilingual proficiency in English and Bahasa Melayu. Owing to the then-imposed COVID-19 movement restrictions in Malaysia, the academics evaluated the PAQ of their residential environments with the single most preferred translated attributes in the Stage 1b translations. Upon completion of the in-situ evaluation, the participants were further provided with the English version and the rest of the Stage 1b translations for further comments. Any newly suggested translations and comments from the experiential evaluation yielded an updated set of translations (Stage 1c).

A provisional set of translations (Stage 1d) was then determined by the core research team from Nanyang Technological University, Singapore (NTU) and UPM, wherein the translations were selected based on their unanimity and preference across translation sets in Stage 1a to 1c. Subsequently, a consensus-cum-bias evaluation was performed quantitatively on the Stage 1d translations to yield the most “bias-free”, lay, and accurate translations of the eight PAQ attributes (Stage 1e). Notably, the provisional translations were decided based on data-driven decisions by the core research team through the interpretation of the statistical analysis of Stage 1e.

2.2. Participants

A total of 73 participants were recruited across all five substages (1a to 1e), of which 33 were recruited in Singapore (excluding the translator in Stage 1a) and 40 in Malaysia. All substages were conducted remotely and formal ethical approvals were sought in the respective institutions, i.e., the UPM Ethics Committee For Research Involving Human Subjects (JKEUPM) for Stage 1b to 1d (JKEUPM-2019-452); and both the JKEUPM and the NTU Institutional Review Board (NTU-IRB) for Stage 1e (JKEUPM-2019-452 and IRB-2021-293).

In Stage 1a, a local graduate student majoring in applied linguistics at NTU, with native bilingual proficiency in English and Bahasa Melayu, was recruited to provide an initial translation. Subsequently, three linguistics academics from...
the Department of English, Faculty of Modern Languages and Communication at UPM, who were bilingually fluent in English and Bahasa Melayu, took part in the FGD in Stage 1b. The three academics were from different ethnic groups, namely Chinese, Malay, and Dusun. Another four non-linguistic and non-acoustic academics from UPM – three native Malays and one Indian – were recruited for the experiential evaluation in Stage 1c. The provisional translations were determined by the consensus of all the co-authors in Stage 1d.

For the quantitative evaluation survey in Stage 1e, a total of 66 participants were recruited via email and messaging services. To achieve a cross-national comparison, approximately equal numbers of participants were recruited in Singapore and Malaysia. The reported country of residence were approximately equal, i.e., 33 (50.00%) in Singapore, 30 (45.45%) in Malaysia, 3 (4.55%) elsewhere. Based on the self-reported language proficiency via the Interagency Language Roundtable (ILR) scale, wherein participants declared their ILR proficiency in both ENG and ZSM, most participants were bilingually proficient. Few participants reported limited working proficiency in Malay (9.09%) and English (1.52%), and none of the participants reported elementary proficiency or worse. Most participants have resided in Malaysia or Singapore for most of their lives, whereby only 11 (10.00%) reported staying outside Singapore and/or Malaysia cumulatively for more than five years. All the participants were from diverse disciplines, where only 15.15% were from audio-related disciplines. A detailed breakdown of the participant demographics, grouped by reported countries of residence is shown in Table 2.

### 2.3. Quantitative evaluation methodology
The evaluation of the Stage 1d preliminary translations employs the quantitative evaluation framework proposed by Watcharasupat et al. (2022), wherein attributes on the main axes (i.e., *eventful*, *pleasant*, *uneventful*, *annoying*) were evaluated on their appropriateness (APPR), understandability (UNDR), clarity (CLAR), antonymity (ANTO), orthogonality (ORTH), non-connotativeness (NCON), and implicative balance (IBAL). The attributes on the derived axes (i.e., *vibrant*, *calm*, *monotonous*, *chaotic*) are also assessed on their APPR, UNDR, CLAR, IBAL, as well as on their connotativeness (CONN). In the following section, we define the normalized rating of a participant to a questionnaire prompt by \( r_{[qn]} \in [0, 1] \) where \([qn]\) represents the prompt, the contribution of a rating to a score by \( s_{[cr]} \in [0, 1] \) where \([cr]\) represents the criterion. References to adjacency, orthogonality, antipodal-ity of PAQ attributes are based on the octant circumplex model in ISO/TS 12913-3:2019 (International Organization for Standardization, 2019), and depicted in Figure 1 (reproduced from Watcharasupat et al. (2022, Figure 1).

The appropriateness score is a direct rating (i.e., \( s_{\text{APPR}} = r_{\text{APPR}} \)) of a translation candidate’s suitability in representing the meaning of the English attribute in the context of soundscape, with a score 0 indicating complete disagreement and a score of 1 indicating complete agreement.

Understandability is a direct rating (i.e., \( s_{\text{UNDR}} = r_{\text{UNDR}} \)) in terms of its ease of comprehension by the general population, where a score of 0 represents complete inability in comprehension and 1 represents fully understandable by a layperson.

Clarity measures the degree of association of a candidate with adjacent attributes on the circumplex model of PAQ. It is computed based on penalising the associativeness ratings of the candidate as a translation of clockwise (CW) and counter-clockwise (CCW) adjacent attributes, i.e. \( r_{\text{ASSO}}^{-1} \) and \( r_{\text{ASSO}}^{-1} \) respectively. Hence, the clarity score is given by

\[
s_{\text{CLAR}} = 1 - 0.5 \left( r_{\text{ASSO}}^{-1} + r_{\text{ASSO}}^{-1} \right),
\]

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where a score of 1 implies total clarity and that of 0 implies complete association with both adjacent attributes.

In the circumplex design, antipodal or simply "opposite" attributes on the main axes should be direct antonyms. Hence, the antonymity score is based on direct rating (i.e., $s_{\text{ANTO}} = r_{\text{ANTO}}$) of the candidate antonymity to the opposite attribute on the main axis.

Additionally, main-axis attributes should be minimally biased towards either CW or CCW adjacent derived-axis attributes. The orthogonality score is based on the deviation of a single biasness rating towards either adjacent attributes (i.e. $r_{\text{BIAS}} = 0$ indicates full biasness towards the CCW attribute and $r_{\text{BIAS}} = 1$ does so towards the CW attribute). The orthogonality score is given by

$$s_{\text{ORTH}} = 1 - 2| r_{\text{BIAS}} - 0.5 |. \quad (2)$$

Hence, $s_{\text{ORTH}} = 0$ indicates full bias towards either of the adjacent attributes and $s_{\text{ORTH}} = 1$ represents complete neutrality (i.e. $r_{\text{BIAS}} = 0.5$ ). Since it was previously found that the derived axis attributes were not fully equidistant from the main axes in other languages (Tarlao et al., 2016; Jeon et al., 2018; Watcharasupat et al., 2022), and were originally derived from locating attributes that resided along the 45° diagonals of the principle components plot near the unit circle (Axelsson et al., 2010), the derived axes are not assessed based on $s_{\text{ORTH}}$ nor $s_{\text{ANTO}}$. Instead, the derived attributes should be analysed based on their skew or implicativeness towards the adjacent main axes, which are mostly stable across languages.

The implicativeness of an attribute towards adjacent attributes are rated via an implicative score for CW ($r_{\text{IMPL}}^C$) and CCW ($r_{\text{IMPL}}^C$) adjacent attributes, where 0 indicates that the attribute does not imply its adjacent attribute and 1 indicates that it fully implies its adjacent attribute.

Main-axis attributes should not also imply the adjacent attributes on the derived axes, which is represented by a non-connotativeness score written as

$$s_{\text{NCON}} = 1 - 0.5 ( r_{\text{IMPL}}^C + r_{\text{IMPL}}^C ). \quad (3)$$

In contrast, derived axes attributes should imply both the adjacent main-axis attributes, yielding a connotative score given by

$$s_{\text{CONN}} = 0.5 ( r_{\text{IMPL}}^C + r_{\text{IMPL}}^C ). \quad (4)$$

Lastly, the balance of implicativeness towards either CW or CCW adjacent attributes are determined by the implicative balance score give by

$$s_{\text{IBAL}} = 1 - | r_{\text{IMPL}}^C - r_{\text{IMPL}}^C |. \quad (5)$$

Since translations of the main axis attributes are hardly completely non-connotative, the IBAL scores are computed for both main and derived axis attribute translations.

### 2.4. Data analysis

The cross-national nature of this study resulted in the data being collected in a replicated unbalanced complete block design manner, whereby translation candidates were the blocks to be examined and the countries were the grouping factor. As a result, when testing for inter-country differences, the Prentice test (PT; Prentice, 1979) was used for data analysis involving two or more translation candidates under test. The Prentice test is a generalization of the Friedman test (Friedman, 1937) that can handle replicated, incomplete, and/or unbalanced block design, a situation commonly encountered in cross-population soundscape studies. Where significant differences were found at 5 % significance level, a pairwise posthoc Mann-Whitney-Wilcoxon rank sum test (MWWT) with Bonferroni corrections was conducted.
3. Preliminary translations: Stages 1a to 1d

Stages 1a to 1d are exploratory investigations into the semantic, experiential, and contextual aspects of the attributes translations. Although the binational nature of the translation calls for a validated team-based translation approach (Curtarelli and van Houten, 2018; Behr, 2018), the TRAPD method was not adopted owing to resource constraints and the nascent of the soundscape field in MY. Instead, a modified team-based triangulation approach was designed, which also examines the underlying circumplexity of the PAQ attributes via a quantitative evaluation as the final stage. Table A.1 in Appendix A shows the summary of the translation process of the attributes, including the quantitative evaluation in Stage 1e.

3.1. Stage 1a: Semantic translation (initial translations)

In Stage 1a, a qualified translator (instead of 2 or more in TRAPD due to cost) who was bilingually fluent in ENG and ZSM was enlisted in SG to provide an initial list of translations. This was motivated by the preconceived notion that a more appropriate translation could be attained due to greater bilingual proficiency in SG, as well as a higher probability of ensuring a lay translation due to the prevalence of conversational ZSM in SG in contrast to formal ZSM in MY. It is thus of priority to first derive semantic translations from a linguistics perspective for the layperson rather than from a domain perspective. Nonetheless, the translator in Stage 1a was briefed on the purpose of the attributes as descriptors of the acoustic environment, but without detailing the underlying circumplexity of the 8 PAQ attributes.

An initial translation of five out of the eight attributes generated a single suggestion each, namely meriah for eventful, menyenangkan for pleasant, membingitkan for annoying, membosankan for monotonous, and kacau-bilau for chaotic. The other attributes have two suggestions each with a preferred choice by the translator: tidak meriah is preferred as compared to hambur dan senyap for uneventful, bersemarak as compared to rancak for vibrant, and tenang as compared to tidak kecoh for calm.

3.2. Stage 1b: Focus group discussion (exploratory translations)

To further evaluate the semantics of the "lay" SG-based Stage 1a translations, a focus group discussion (FGD) consisting of 3 different ethnicities, bilingually-fluent linguists from the Department of English, Faculty of Modern Languages and Communication at UPM, was conducted and facilitated by a soundscape researcher at UPM in MY. Stage 1b is akin to the TRAPD "review" step, but without the original translator in Stage 1a for a localized (i.e. MY) review. Due to pandemic restrictions, the FGD was conducted virtually and the linguists were briefed on the domain specific context of the PAQ translations by the soundscape researcher. Consensus voting was employed to either accept or omit Stage 1a translations, and new translations could also be introduced if deemed appropriate.

There was unanimous preference in main axis attributes meriah for eventful, tidak meriah for unpleasant due to its parallelism with meriah, and menyenangkan for pleasant. In derived axis attributes, tenang for calm, and membosankan for monotonous were unanimously preferred. For vibrant, bersemarak was acceptable but rancak appeared more layman, and thus both were retained. In contrast, hambur dan senyap for uneventful and tidak kecoh for calm were unanimously omitted. The translation hambur dan senyap was omitted due to inherent negative connotations although it should be neutral; whereas tidak kecoh contains the negation term tidak, which deviates from the intended meaning in ENG.

New translations were also introduced through the FGD, namely, menjengkelkan for annoying and kurang kepelbagaian dan membosankan for monotonous. The translation menjengkelkan was introduced as membingitkan is possibly uncommon to the lay person despite being similarly uncommon; whereas kurang kepelbagaian dan membosankan was suggested to mean both “uneventful” and “unpleasant” for greater connotativeness. Hence, a set of exploratory translations consisting of Stage 1a translations after omission (i.e. hambur dan senyap, tidak kecoh) and addition (i.e. menjengkelkan, kurang kepelbagaian dan membosankan) of translated attributes were finalised by the lead reviewer (soundscape researcher at UPM) for the next stage.

3.3. Stage 1c: Experiential evaluation (preparatory translations)

A contextual experiential evaluation stage was designed as a local “pretest” with the target population. Hence, four...
academics who were neither linguists nor acousticians, but were bilingually-fluent in ENG and ZSM were recruited for Stage 1c. Three of them were native Malays and one was Indian. Due to pandemic movement restrictions, the participants evaluated their surrounding acoustic environments using the ZSM questionnaire in Table B.2. Upon completion, the participants were provided with the ENG questionnaire and other translations for comments, as shown in Table B.3.

There was unanimous agreement among the participants for main axis attribute translations. Notably, the translation *menjengkelkan* for annoying was shown to the participants but received no comments. For the derived axis attribute translations, translations for vibrant were similar with the conclusions in Stage 1b, whereby *bersemarak* was less understandable. The translation *tenang* for calm was agreeable by most, and *menenangkan* was additionally suggested to mean “calming” by two participants. In translations of monotonous, *membosankan* was unanimously preferred as *kurang kepelbagaian dan membosankan* was found to be double-barreled. An additional translation *tidak berubah* (lit. unchanging) was also suggested. In contrast with Stage 1b, there was no consensus in *kacak-bilau* for chaotic, and thus *huru-hara* was suggested to describe an atmosphere, and *kelam-kabut* to describe a place.

In summary, new translations of *menenangkan* for calm, *tidak berubah* for monotonous, as well as *huru-hara* and *kelam-kabut* both for chaotic, were suggested in Stage 1c.

### 3.4. Stage 1d: Committee review (preliminary translations)

To arrive at a preliminary set of translations, a committee review by the binational core research team was conducted. This is akin to the "adjudication" phase in the TRAPD framework. The candidates were accessed based on consensus voting to form the preliminary list of translations.

The attributes *meriah* for eventful and *menyenangkan* for pleasant achieved congruence across the four stages of the translation process. For their antitheses *uneventful* and *annoying*, each has two translations. For uneventful, the two translations in Stage 1a are *tidak meriah* and *hambar dan senyap*. As there is unanimity in the use of *meriah* for its opposite attribute of eventful, and *tidak* literally refers to the prefix “un-” in uneventful, *tidak meriah* is preferred for uniformity. For annoying, *membingitkan* was agreed as an accurate translation but there was a concern in Stage 1b that it may not be common to the general public. As such, another translation *menjengkelkan* was introduced in Stage 1b and both terms were included in the preliminary list to investigate their idiomatic qualities.

The translation process of the attributes in derived axes introduces more alternatives as compared to the translation of the attributes in main axes, possibly due to the need in fulfilling the bilateral condition of each of the four attributes in the derived axes as being *(un)eventful and (un)pleasant*. *Vibrant* was translated into *bersemarak* and *rancak* with the latter being considered more of a layperson term. Although *bersemarak* is accepted in Stages 1a and 1b, it did not reach a consensus in Stage 1c with one participant viewing it as difficult to understand. To investigate their understandability for soundscape research, both terms are included in the preliminary list for quantitative evaluation. *Calm* was translated as *tenang* and also *menyenangkan*, with both included in the preliminary list for further investigation. The other translation for *calm*, *tidak kecoh*, was omitted as the negation *tidak* (lit. not) was not used in the original English attribute.

The attribute monotonous is compound in its meaning, i.e., its denotative aspect of being unchanging and its affective quality of being boring. The translation *membosankan* (lit. boring) was mostly preferred in Stages 1a to 1c, but there were also other suggestions of *tidak berubah* (lit. unchanging) or *kurang kepelbagaian dan membosankan* (lit. lack of variety and boring). As boredom can be caused by other factors besides it being uneventful, such as lack of interest, the translation *membosankan* seems to necessitate the attachment of another word that depicts the aspect of it being repetitive, unchanging or lacking variety. Nevertheless, the use of *kurang kepelbagaian dan membosankan* in Stage 1c was commented as double-barrelled and confusing; this translation is perceived as a duality possibly because the two descriptors are connected with the word *dan* (lit. and). In English, the twofold meaning of *monotonous* is perceived as one united attribute through the usage of a single word. However, the translation process was unable to propose another one-word literal translation in Malay that contains both psycholinguistic elements. The twofold meaning of *monotonous* also posed a problem in other languages as well [i.e. Korean (Jeon et al., 2018), French (Tarlao et al., 2016)]. Hence, another conjunction *oleh itu* (lit. thus) was suggested for the preliminary list (Stage 1d) to form *tidak berubah oleh itu membosankan*, in order to narrow the cause of mundanity down to the unchanging nature of the acoustic environment.

The attribute chaotic was initially translated to *kacak-bilau*. There was no disagreement in Stage 1b, but the participants in Stage 1c did not concur with this translation and suggested another two translations of *huru-hara* and *kelam-kabut*. The contextual usage of each term may be different thus all the latter two translations were included in the preliminary list for quantitative evaluations.

### 4. Stage 1e: quantitative evaluation (provisional translations)

Since the differences between Singapore and Malaysia respondents are being investigated, 3 (4.55%) of the 66 participants whose self-reported current countries of residence (CCR) are outside of Singapore (SG) and Malaysia (MY) were excluded in the analyses. Where more than one translation candidate per PAQ attribute were assessed, the differences were evaluated via PTs, wherein the candidates and CCR were the blocking and grouping factors, respectively. Only if a statistically significant difference in distributions was found, a posthoc MWWT with Bonferroni correction was conducted for pairwise differences between the CCR for each candidate. For cases where only one candidate was
assessed, the differences across the CCR split (i.e., MY v. SG) were evaluated via the KWT The mean criterion scores across CCR are summarised in Table C.1, and visualized in radar plots in Figure 2 for clarity. Additionally, the p-values of the PT and MWWT analyses are summarised in Table C.2 and Table C.3, respectively.

4.1. Main axes

Based on the preliminary translations in Stage 1d, only one translation candidate was selected for eventful, pleasant, and uneventful, i.e., meriah, menyenangkan, and tidak meriah, respectively, whereas there were two candidates to be evaluated for annoying – membingitkan and menjengkelkan. The main axis translation candidates were evaluated on their APPR, UNDR, CLAR, ANTO, ORTH, NCON, and IBAL.

Although inter-candidate comparison for attribute with a single translation cannot be made, the applicability of these candidates were thus evaluated across the CCR via the KWT. No significant differences were found between MY and SG for all evaluation criteria (APPR, UNDR, CLAR, ANTO, ORTH, NCON, IBAL) on translations of pleasant and uneventful (i.e., menyenangkan, and tidak meriah, respectively). Hence, translations of pleasant, and uneventful appear to be suitable across MY and SG. For the translation of eventful (i.e., meriah), no significant differences were found across all criteria with the exception of UNDR (p < 0.05, η² < 0.06). This shows that meriah is significantly more understandable in MY (μMYmeriah = 0.960) than in SG (μSGmeriah = 0.900).

The differences between the two translation candidates across CCR for annoying — membingitkan and menjengkelkan — were evaluated via PT on all criteria, where significant differences were found only for UNDR (p < 0.05). The posthoc MWWT showed a significant difference between MY and SG (p < 0.01) for UNDR. This indicates that menjengkelkan is significantly more understandable in MY (μMYmenje = 0.823) than in SG (μSGmenje = 0.609).

4.2. Derived Axes

The translation candidates for derived axis attributes were evaluated on their APPR, UNDR, CLAR, IBAL and CONN. Two candidates were evaluated for translations of vibrant (i.e., rancak, bersemarak), calm (i.e., tenang, menenangkan), and chaotic (i.e., huru-hara, kelam-kabut). For monotonous, there were three candidates under evaluation (i.e., membosankan, tidak berubah oleh itu membosankan, kurang kepelbagaian oleh itu membosankan). The PT showed no significant differences between translation candidates for monotonous across the two CCR groups.

The PT results for vibrant revealed significant differences only in CLAR (p < 0.05). However, the posthoc MWWT revealed that there were no significant differences between countries for each candidate. Significant differences were found only in CONN (p < 0.05) in the PT for translations of calm across CCR groups. Posthoc pairwise comparisons with MWWT revealed significant differences between CCR (p < 0.05), wherein menenangkan had a significantly higher connotative score in SG (μSGmenen = 0.636) than MY (μMYmenen = 0.537).

For chaotic, significant differences were found for APPR (p < 0.001), CLAR (p < 0.001), and CONN (p < 0.05) in the PT for differences across candidate blocks across CCR groups. The posthoc MWWT revealed significant differences in CONN (p < 0.05) and CLAR (p < 0.01) for huru-hara. It could be interpreted that huru-hara has a significantly higher CONN score in SG (μSGhuru = 0.547) than in MY (μMYhuru = 0.380), but has significantly greater clarity in MY (μMYhuru = 0.715) than in SG (μSGhuru = 0.523). It was also found that kelam-kabut was deemed significantly more appropriate in MY (μAPPRKelam = 0.880) than in SG (μCLARKelam = 0.709).

5. Discussion

5.1. Cross-national effects on main axis attributes

Based on the KWT scores in Section 4.1, no statistically significant differences were found between SG and MY across all evaluation criteria for pleasant and uneventful. Hence, the proposed translations menyenangkan and tidak meriah are generally applicable across both countries and agrees with the preliminary translations. Interestingly, menyenangkan was also independently verified as the most suitable translation for pleasant in Bahasa Indonesia (Sudarsono et al., 2021). Even though meriah (as a translation of eventful) was significantly less understood in SG than MY, albeit with weak significance and small effect size, the understandability score of meriah is still very high in the SG population (μSGmeriah = 0.9). Moreover, the meriah–tidak meriah translation pair forms a parallelism with the eventful–uneventful pair and should thus be used as such. Hence, menyenangkan, meriah, and tidak meriah are confirmed as provisional translations of pleasant, eventful, and uneventful, respectively.

Between SG and MY populations, translations for annoying were significantly different in UNDR scores. It was found that menjengkelkan was significantly less understandable to the layman in SG than in MY. Since 95% of the Malay-speaking population in SG expressed high levels of proficiency in Bahasa Melayu (Mathews et al., 2020), the lower understandability of menjengkelkan could be attributed to its lack of conversational use in SG. Nonetheless, intra-country differences should be examined between candidates before the confirmatory selection of provisional translation candidates.

5.2. Cross-national effects on derived axis attributes

Between countries, no significant cross-national differences were found across all criteria for all monotonous and vibrant translation candidates, as shown in the PT and posthoc MWWT in Section 4.2, respectively. Between both translations of calm, cross-national differences were found via PT and MWWT only in menenangkan in terms of connotativeness. Since the indicative scores
Figure 2: Mean scores of the MY-only main (a) and derived axes (b), and SG-only main (c) and derived (d) axes of the participants in stage 1e. Criteria scores of appropriateness (APPR), understandability (UNDNR), clarity (CLAR), antonymy (ANTO), orthogonality (ORTH), non-connotativeness (NCON), and implicative balance (IBAL) were computed for the provisional translations of main axis; and APPR, UNDR, CLAR, IBAL, and connotativeness (CONN) for the provisional translations of derived axis attributes.

Towards pleasant were similar across countries ($\mu_{SG;menen}^{menen} = 0.782, \mu_{MY;menen}^{menen} = 0.770$), the higher connotative score for menenangkan in SG could be attributed to a more strongly implied meaning towards uneventful ($\mu_{SG;menen}^{uneventful} = 0.491; \mu_{MY;menen}^{uneventful} = 0.303$).

Cross-national differences were also found in translations of chaotic, in APPR, CLAR, and CONN. The significantly higher connotativeness of huru-hara in SG than in MY could be attributed to a more strongly implied meaning towards both annoying and eventful ($\mu_{SG;huru}^{annoying} = 0.579; \mu_{SG;huru}^{eventful} = 0.380; \mu_{MY;huru}^{annoying} = 0.515; \mu_{MY;huru}^{eventful} = 0.380$). Conversely, huru-hara has significantly greater clarity in MY as a result of lower associations towards annoying and eventful than in SG ($\mu_{SG;huru}^{IBAL} = 0.552; \mu_{MY;huru}^{IBAL} = 0.317; \mu_{SG;huru}^{IBAL} = 0.403; \mu_{MY;huru}^{IBAL} = 0.253$). Even though there is a greater desired implied meaning to annoying or eventful, there is a risk that huru-hara could be mistaken as a translation for annoying or eventful in the SG population. The significantly lower appropriateness of kelam-kabut in SG could be attributed to its uniquely Singaporean colloquial meaning of being “muddled” or being in a state of mental confusion (Gwee, 2017).

Table 3
Provisional translations of the 8 ISO 12913-2 PAQ attributes from ISO 639-3: ENG to ISO 639-3: ZSM

| English     | Bahasa Melayu      |
|-------------|--------------------|
| pleasant    | menyenangkan       |
| annoying    | membingitkan (SG); menjengkelkan (MY) |
| eventful    | meriah             |
| uneventful  | tidak meriah       |
| vibrant     | rancak             |
| calm        | tenang             |
| monotonous  | membosankan        |
| chaotic     | huru-hara          |

5.3. Intra-country differences

As a final step, a KWT was conducted to determine if intra-country differences produced any contradictory results for translations with multiple candidates (i.e., annoying, vibrant, calm, monotonous, chaotic).

For the translation of annoying, membingitkan in SG was significantly more understandable ($p < 0.01, 0.06 < \eta^2 < 0.14$), but had a significantly lower IBAL score ($p < 0.01, 0.06 < \eta^2 < 0.14$) than menjengkelkan in SG. On the contrary, menjengkelkan in MY was both significantly more appropriate ($p < 0.05, 0.06 < \eta^2 < 0.14$) and had higher non-connotativeness than membingitkan in MY. The...
Figure 3: Mean scores of all participants in stage 1e across appropriateness (APPR), understandability (UND), clarity (CLAR), antonymy (ANTO), orthogonality (ORTH), non-connotativeness (NCON), and implicative balance (IBAL) for the provisional translations of main axis (left); and APPR, UNDR, CLAR, IBAL and connotativeness (CONN) for the provisional translations of derived axis attributes (right).

intra-country differences suggest that membisingitan should be preferred over menjengkelkan in SG on the basis of understandability, whereas menjengkelkan has emerged as the most appropriate translation for annoying in MY.

Intra-country differences in the translation of vibrant was only observed within MY, whereby rancak was found to be more understandable than bersemarak. Therefore, a singular translation via rancak was deemed sufficient.

For the translation of calm, tenang in SG was found to be significantly more appropriate ($p < 0.001, \eta^2 > 0.14$) and understandable ($p < 0.001, \eta^2 > 0.14$) than menenangkan in SG. Similarly, tenang in MY was significantly more appropriate ($p < 0.001, \eta^2 > 0.14$) and understandable ($p < 0.05, 0.06 < \eta^2 < 0.14$) than menenangkan in MY. Thus, the singular translation in tenang is suitable in both SG and MY.

Across the three candidates for monotonous, significant differences were found only in UNDR for SG ($p < 0.01, 0.06 < \eta^2 < 0.14$), but in both APPR ($p < 0.05, 0.06 < \eta^2 < 0.14$) and UNDR ($p < 0.001, \eta^2 > 0.14$) for MY in the KWTs. Posthoc CITs revealed that membosankan in SG was significantly more understandable than both its phrasal variants tidak berubah oleh itu membosankan in SG ($p < 0.01$) and kurang kepelbagaian oleh itu membosankan in SG ($p < 0.01$). Likewise, membosankan in MY was significantly more understandable than tidak berubah oleh itu membosankan in MY ($p < 0.001$) and kurang kepelbagaian oleh itu membosankan in MY ($p < 0.05$). Although kurang kepelbagaian oleh itu membosankan in MY had significantly higher appropriateness over tidak berubah oleh itu membosankan in MY ($p < 0.05$), it was similarly appropriate to membosankan in MY. Hence, the singular translation of membosankan is thus the most suitable translation for monotonous.

Lastly, significant differences were observed only in APPR within both SG ($p < 0.001, \eta^2 > 0.14$) and MY ($p < 0.01, 0.06 < \eta^2 < 0.14$) for the translation of chaotic. Since huru-hara in both SG and MY was significantly more appropriate than kelam-kubat in each country respectively, this provides further evidence that huru-hara is suitable across and within countries as a translation of chaotic.

5.4. Final provisional translations of PAQ attributes to ISO 639-3: ZSM

Based on the cross- and intra-country analysis of stage 1e, the final set of provisional translations for ISO 639-3:ZSM are summarised in Table 3. Except for annoying, all other main attributes were represented by the same single-word translation in ZSM across both Singapore and Malaysia. For annoying, membisingitan was selected for SG based on its significantly greater cross- and intra-country understandability, whereas menjengkelkan was confirmed as the provisional translation in MY due to intra-country advantage in appropriateness and non-connotativeness.

In the absence of cross-national differences, intra-country understandability was found to be significantly higher in rancak and membosankan in MY and SG, respectively. Hence, rancak and membosankan were confirmed as provisional translations of vibrant and monotonous, respectively. For translations of calm, tenang was significantly more appropriate and understandable than menenangkan within both SG and MY despite stronger connotativeness of menenangkan in SG than MY. Thus, tenang is selected as the final provisional translation of calm. Between the translations of chaotic, the significantly lower appropriateness of kelam-kubat in SG over MY diminishes its suitability over huru-hara. Since intra-country analysis showed that huru-hara was significantly more appropriate within both countries, huru-hara is thus confirmed as the provisional translation of chaotic for both SG and MY.

Visualisation of the mean criteria scores of the main axis and derived axis attribute translations in Figure 3 also reveals potential incompatibility with the assumed circumpolarity of the perceived affective quality model in ISO/TS 12913-3:2019 (ISO, 2019). It should be noted that the low ORTH, NCON, and IBAL scores directly affect the integrity of the main axis assumptions, for example in meriah. Likewise, low CONN and IBAL scores also affect the structural integrity of the derived axes, for instance in membosankan. Hence,
there is an impetus to further investigate the circumplicity of the ZSM translations as well as means for calibration or compensation for the equations in ISO/TS 12913-3:2019 to be valid.

6. Conclusion

This work details the procedure for translating perceptual soundscape attributes in “Method A” of the ISO/TS 12913-2:2018 soundscape technical specification (ISO, 2018) from English (ISO 639-3: ENG) to Standard Malay (ISO 639-3: ZSM), as a part of Stage 1 in the “Soundscape Attributes Translation Project” (SATP) initiative. The methods employed in this study investigated the associated meanings in socio-cultural contexts and applicability in soundscape appraisal of the translations of the eight PAQ attributes into Malay across two countries.

A set of preliminary attribute translations in Standard Malay was first generated by a four-part expert-led process. Even though the expert-led process was a cross-national collaboration between Singapore and Malaysia, it was inadequate to rigorously account for potential cross-national semantic disparities. Hence, a quantitative approach first developed for the Thai language translation in the SATP (Watcharasupat et al., 2022) was adopted for the cross-national analysis of the Standard Malay preliminary translations.

The quantitative evaluation framework successfully unveiled cross-national differences in the translation of annoying, but otherwise agreed with the preliminary translations. Moreover, analysis of the structural criteria scores across candidates also indicated a potential violation of circumplicity. For instance, the provisional translation eventual has a relatively low orthogonality and undesirably high implicational connotations of vibrant and chaotic, which challenges the circumplicity assumptions and affects the applicability of formula “A.2” in ISO/TS 12913-3:2019 (ISO, 2019).

Further research can be conducted on the cross-cultural compatibility of the Malay translations among different bilingual or multilingual ethnicities that reside in both countries.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This work was supported by the National Research Foundation, Singapore, and Ministry of National Development, Singapore under the Cities of Tomorrow R&D Program (CoT Award: COT-V4-2020-1), and the Google Cloud Research Credits program (GCP205559654). Any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and do not reflect the view of National Research Foundation, Singapore, and Ministry of National Development, Singapore.

The authors would like to thank Dr. Francesco Aletta, Dr. Tin Oberman, Dr. Andrew Mitchell, and Prof. Jian Kang, of the UCL Institute for Environmental Design and Engineering, The Bartlett Faculty of the Built Environment, University College London (UCL), London, United Kingdom, for coordinating the SATP project and providing assistance for the Bahasa Melayu Working Group; and Ms. Yun-Ting Lau for her assistance in the data collection.

Data availability

The data that support the findings of this study are openly available in NTU research data repository DR-NTU (Data) at doi:10.21979/N9/AUE2LL, and the replication code is available on GitHub at github.com/ntudsp/satp-zsm-stage1.

CRediT authorship contribution statement

Bhan Lam: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Project administration, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization, Supervision. Julia Chieng: Conceptualization, Methodology, Validation, Investigation, Resources, Writing - Review & Editing, Project administration. Karm N. Watcharasupat: Methodology, Software, Validation, Formal analysis, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization. Kenneth Ooi: Formal analysis, Resources, Writing - Review & Editing. Zhen-Ting Ong: Resources, Project administration. Joo Young Hong: Resources, Funding acquisition. Woon-Seng Gan: Resources, Writing - Review & Editing, Supervision, Funding acquisition.

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### Appendix A. Summary of the Translation Process

#### Table A.1
Translation process of the main axis PAQ attributes from English to Bahasa Melayu across all sub stages (1a to 1e)

| Attribute          | Translation | Stage 1a | Stage 1b | Stage 1c | Stage 1d | Stage 1e |
|--------------------|-------------|----------|----------|----------|----------|----------|
| eventful           | meriah      | ✔️        |          |          |          | selected |
| pleasant           | menyenangkan| ✔️        |          |          |          | selected |
| uneventful         | tidak meriah| ✔️ preferred| preferred in parallel with “meriah”, as in ENG i.e., ‘uneventful’ and ‘eventful’ | agreed by most | unanimous preference | selected |
|                    | hambar dan senyap | introduced | unanimous omission (negative connotation as “uneventful” is neutral) | — | — | — |
| annoying           | membingitkan | ✔️        |          |          |          | selected |
|                    | menjengkelkan | — | may be uncommon | no comments | unanimous for inclusion in 1e | selected |
| vibrant            | bersemarak   | ✔️ preferred | can be accepted | difficult to understand | unanimous for inclusion in 1e | omitted |
| rancak             | — | introduced | more layman | preferred by most | unanimous preference | selected |
| calm               | tenang       | — | introduced | unanimous omission (“tidak” means ‘not’; negation) | — | — | — |
|                    | menenangkan | — | — | suggested by two participants (means ‘calming’) | | | |
| monotonous         | membosankan  | ✔️        |          |          |          | selected |
|                    | kurang kepelbagaian | — | to translate both the ‘uneventful’ and “unpleasant” aspects of the attribute | double-barrelled | unanimous omission | — |
|                    | dan membosankan | — | — | — | — | |
|                    | tidak berubah | — | — | only means “unchanging” thus lacking inclusiveness | unanimous omission | — | |
|                    | tidak berubah oleh itu membosankan | — | — | — | | |
|                    | kurang kepelbagaian oleh itu membosankan | — | — | — | | |
|                    | kurang kepelbagaian | — | — | — | | |
|                    | kurang kepelbagaian oleh itu membosankan | — | — | — | | |
|                    | kacau-bilau | ✔️        | no disagreement | no consensus | unanimous omission | — |
|                    | huru-hara | — | — | | | |
|                    | kelam-kabut | — | — | | | |

- : candidate introduced at this stage.
- ■: candidate removed after this stage.
- ⋆: candidate selected for Stage 2.
Appendix B. Translations of the perceived affective quality questionnaire to Bahasa Melayu

Table B.1
Translation of the perceived affective quality (PAQ) questionnaire from ISO/TS 12913-2:2018 (ISO, 2019, C.3.1.3) to Bahasa Melayu, as used in Stage 1a. The upright text shows the Bahasa Melayu version as presented to the participants. The following italicized text in square brackets indicates the corresponding English counterpart from ISO/TS 12913-2:2018.

Kualiti Afektif Yang Dirasakan [Perceived Affective Quality]

Untuk setiap skala di bawah, sejauh mana anda bersetuju atau tidak bersetuju, bahawa bunyian yang mengelilingi persekitaran anda sekarang adalah... (Sila tandakan satu kotak di setiap baris)

[For each scale below, to what extent do you agree or disagree, that the present surrounding sound environment is ... (Please tick off one response alternative per scale.)]

| Sangat bersetuju | Bersetuju | Bukan tidak bersetuju | Tidak bersetuju | Sangat tidak bersetuju |
|------------------|-----------|------------------------|------------------|------------------------|
| [Strongly agree] | [Agree]   | [Neither agree, nor disagree] | [Disagree] | [Strongly disagree] |

Menyenangkan [Stage 1a trans. “pleasant”]

Kacau-bilau [Stage 1a trans. “chaotic”]

Bersemarak; Rancak [Stage 1a trans. “vibrant”]

Tidak meriah; Hambar dan senyap [Stage 1a trans. “uneventful”]

Tenang; Tidak kecoh [Stage 1a trans. “calm”]

Membingitkan [Stage 1a trans. “annoying”]

Meriah [Stage 1a trans. “eventful”]

Membosankan [Stage 1a trans. “monotonous”]

Table B.2
The translated PAQ questionnaire to Bahasa Melayu, as used in Stage 1c. The upright text shows the Bahasa Melayu version as presented to the participants. The following italicized text in square brackets indicates the corresponding English counterpart. The attributes were rated on a visual analog scale (VAS) from “Not at all” to “Completely”.

Secara keseluruhannya, bagaimanakah anda menilai bunyi persekitaran anda sekarang?
[Overall, how would you describe the present surrounding sound environment?]

| Tidak sama sekali [Not at all] | Melampau [Completely] |
|--------------------------------|------------------------|
| 1. Meriah [“eventful”]        | ●                      |
| 2. Bersemarak [“vibrant”]     | ●                      |
| 3. Menyenangkan [“pleasant”]  | ●                      |
| 4. Tenang [“calm”]            | ●                      |
| 5. Tidak meriah [“uneventful”] |●                      |
| 6. Kurang kepelbagaian dan membosankan [“monotonous”] | ● |
| 7. Membingitkan [“annoying”]  | ●                      |
| 8. Kacau-bilau [“chaotic”]    | ●                      |
The translated supplementary PAQ questionnaire to Bahasa Melayu with other translations, as used in Stage 1c. This questionnaire was provided to the participants after completion of the experiential evaluation with the questionnaire in Table B.2. The upright text shows the Bahasa Melayu version along with italicized text in square brackets indicating the corresponding English counterpart, both of which was presented to the participants for further comments.

| Tidak sama sekali [Not at all] | Melampau [Completely] |
|-------------------------------|------------------------|
| Meriah ['eventful']          |                        |
| Bersemarak; Rancak ['vibrant']|                        |
| Menyenangkan ['pleasant']    |                        |
| Tenang ['calm']              |                        |
| Tidak meriah; Hambar dan senyap ['uneventful'] | |
| Kurang kepelbagaian dan membosankan; Membosankan ['monotonous'] | |
| Membingitkan; Menjengkelkan ['annoying'] | |
| Kacau-bilau ['chaotic']      | |

Appendix C. Results of Statistical Tests on the Evaluation Scores

Table C.1
Mean evaluation scores for the attributes across the combined, Malaysian-only, and Singaporean-only populations.

| Attribute | Criterion | Translation Candidate | Mean Score |
|-----------|-----------|-----------------------|------------|
|           |           |                       | Combined   | MY   | SG   |
| pleasant  | APPR      | menyenangkan          | 0.840      | 0.857 | 0.824 |
|           | UNDR      | menyenangkan          | 0.910      | 0.900 | 0.918 |
|           | CLAR      | menyenangkan          | 0.526      | 0.557 | 0.498 |
|           | ORTH      | menyenangkan          | 0.613      | 0.633 | 0.594 |
|           | ANTO      | menyenangkan          | 0.624      | 0.647 | 0.603 |
|           | NCON      | menyenangkan          | 0.444      | 0.483 | 0.408 |
|           | IBAL      | menyenangkan          | 0.563      | 0.633 | 0.500 |
| annoying  | APPR      | membingitkan          | 0.803      | 0.783 | 0.821 |
|           |           | menjengkelkan         | 0.846      | 0.897 | 0.800 |
|           | UNDR      | membingitkan          | 0.773      | 0.767 | 0.779 |
|           |           | menjengkelkan         | 0.711      | 0.823 | 0.609 |

[Continued on next page]
| Attribute   | Criterion   | Translation Candidate             | Mean Score |
|-------------|-------------|-----------------------------------|------------|
|             |             |                                   | Combined   |
|             |             |                                   | MY         |
|             |             |                                   | SG         |
| CLAR        | membingitkan| 0.608                             | 0.608      |
|             | menjengkelkan| 0.648                             | 0.673      |
| ORTH        | membingitkan| 0.590                             | 0.647      |
|             | menjengkelkan| 0.530                             | 0.540      |
| ANTO        | membingitkan| 0.716                             | 0.740      |
|             | menjengkelkan| 0.716                             | 0.730      |
| NCON        | membingitkan| 0.554                             | 0.649      |
|             | menjengkelkan| 0.554                             | 0.675      |
| IBAL        | membingitkan| 0.565                             | 0.576      |
|             | menjengkelkan| 0.565                             | 0.777      |
| eventful    | APPR        | meriah                            | 0.673      |
|             | UNDR        | meriah                            | 0.929      |
|             | CLAR        | meriah                            | 0.540      |
|             | ORTH        | meriah                            | 0.416      |
|             | ANTO        | meriah                            | 0.586      |
|             | NCON        | meriah                            | 0.406      |
|             | IBAL        | meriah                            | 0.608      |
| uneventful  | APPR        | tidak meriah                      | 0.713      |
|             | UNDR        | tidak meriah                      | 0.902      |
|             | CLAR        | tidak meriah                      | 0.579      |
|             | ORTH        | tidak meriah                      | 0.695      |
|             | ANTO        | tidak meriah                      | 0.668      |
|             | NCON        | tidak meriah                      | 0.513      |
|             | IBAL        | tidak meriah                      | 0.684      |
| calm        | APPR        | menenangkan tenang                | 0.838      |
|             | UNDR        | menenangkan tenang                | 0.910      |
|             | CLAR        | menenangkan tenang                | 0.482      |
|             | CONN        | menenangkan tenang                | 0.589      |
|             | IBAL        | menenangkan tenang                | 0.584      |
| chaotic     | APPR        | huru-hara kelam-kabut             | 0.946      |
|             | UNDR        | huru-hara kelam-kabut             | 0.954      |
|             | CLAR        | huru-hara kelam-kabut             | 0.614      |
|             | CONN        | huru-hara kelam-kabut             | 0.467      |
|             | IBAL        | huru-hara kelam-kabut             | 0.713      |

[Continued on next page]
### Table C.2

Results of the cross-national tests for differences in distributions of the evaluation scores, using either the Prentice test or the Kruskal-Wallis test. Double asterisks (**) and single asterisk (*) indicate statistical significance at 1% and 5%, respectively.

| Attribute | Criterion | Test          | APPR | UNDR | CLAR | ORTH | ANTO | NCON | IBAL |
|-----------|-----------|---------------|------|------|------|------|------|------|------|
| pleasant  | Kruskal-Wallis | 0.352 | 0.822 | 0.178 | 0.581 | 0.656 | 0.051 | 0.089 |
| annoying  | Prentice   | 0.225 | 0.034 | 0.784 | 0.296 | 0.302 | 0.872 | 0.105 |
| eventful  | Kruskal-Wallis | 0.588 | 0.041 | 0.092 | 0.196 | 0.383 | 0.965 | 0.288 |
| uneventful| Kruskal-Wallis | 0.409 | 0.116 | 0.157 | 0.691 | 0.702 | 0.499 | 0.956 |

| Attribute | Test | APPR | UNDR | CLAR | CONN | IBAL |
|-----------|------|------|------|------|------|------|
| calm      | Prentice | 0.212 | 0.243 | 0.324 | *0.026 | 0.512 |
| chaotic   | Prentice | **0.007 | 0.153 | **0.007 | *0.011 | 0.210 |
| vibrant   | Prentice | 0.251 | 0.054 | *0.037 | 0.086 | 0.897 |
| monotonous| Prentice | 0.577 | 0.979 | 0.714 | 0.424 | 0.057 |
Table C.3
Results of the posthoc Mann–Whitney–Wilcoxon pairwise tests for cross-national differences in distributions of the evaluation scores, for evaluation criteria with significant differences from the omnibus tests. Double asterisks (**) and single asterisk (*) indicate statistical significance at 1% and 5%, respectively.

| Attribute | Criterion | Translation Candidate | p-value | Mean Score |
|-----------|-----------|-----------------------|---------|------------|
|           |           |                       |         | MY         | SG         |
| annoying  | UNDR      | membingitkan          | 1.000   | 0.767      | 0.779      |
|           |           | menjengkelkan         | **0.003 | **0.823     | 0.609      |
|           | CLAR      | rancak                | 0.629   | 0.507      | 0.447      |
|           |           | bersemarakan          | 0.109   | 0.508      | 0.408      |
|           | CONN      | tenang                | 0.771   | 0.597      | 0.629      |
|           |           | menenangkan           | *0.048  | 0.537      | **0.636    |
|           | APPR      | huru-hara             | 0.384   | 0.973      | 0.921      |
|           |           | kelam-kabut           | *0.032  | **0.880     | 0.709      |
|           |           |                        | **0.006 | **0.715     | 0.523      |
|           |           |                        | 0.762   | 0.683      | 0.629      |
|           |           |                        | *0.043  | 0.380      | **0.547    |
|           |           |                        | 0.404   | 0.367      | 0.458      |

Table C.4
p-values of the Kruskal–Wallis tests and the posthoc Conover–Iman tests. Double asterisks (**) and single asterisk (*) indicate statistical significance at 1% and 5%, respectively.

| Attribute | Crit. | CCR | Test       | p-value |
|-----------|-------|-----|------------|---------|
| annoying  | APPR  | MY  | Kruskal-Wallis | *0.028  |
|           |       | SG  | Kruskal-Wallis | 0.757   |
|           | UNDR  | MY  | Kruskal-Wallis | 0.441   |
|           |       | SG  | Kruskal-Wallis | **0.009 |
|           | CLAR  | MY  | Kruskal-Wallis | 0.199   |
|           |       | SG  | Kruskal-Wallis | 0.455   |
|           | ORTH  | MY  | Kruskal-Wallis | 0.261   |
|           |       | SG  | Kruskal-Wallis | 0.803   |
|           | ANTO  | MY  | Kruskal-Wallis | 0.577   |
|           |       | SG  | Kruskal-Wallis | 0.979   |
|           | NCON  | MY  | Kruskal-Wallis | *0.026  |
|           |       | SG  | Kruskal-Wallis | 0.315   |
|           | IBAL  | MY  | Kruskal-Wallis | 0.081   |
|           |       | SG  | Kruskal-Wallis | **0.003 |
| calm      | APPR  | MY  | Kruskal-Wallis | **0.001 |
|           |       | SG  | Kruskal-Wallis | **0.0004|
|           | UNDR  | MY  | Kruskal-Wallis | *0.014  |
|           |       | SG  | Kruskal-Wallis | **0.0002|
|           | CLAR  | MY  | Kruskal-Wallis | 0.846   |
|           |       | SG  | Kruskal-Wallis | 0.231   |
|           | CONN  | MY  | Kruskal-Wallis | 0.594   |
|           |       | SG  | Kruskal-Wallis | 0.908   |
|           | IBAL  | MY  | Kruskal-Wallis | 0.622   |
|           |       | SG  | Kruskal-Wallis | 0.531   |

[Continued on next page]
| Attribute   | Crit. | CCR  | Test             | p-value    |
|-------------|-------|------|------------------|------------|
| **chaotic** | APPR  | MY   | Kruskal-Wallis   | **0.007**  |
|             |       | SG   | Kruskal-Wallis   | **0.0004** |
|             | UNDR  | MY   | Kruskal-Wallis   | 0.944      |
|             |       | SG   | Kruskal-Wallis   | 0.884      |
|             | CLAR  | MY   | Kruskal-Wallis   | 0.737      |
|             |       | SG   | Kruskal-Wallis   | 0.085      |
|             | CONN  | MY   | Kruskal-Wallis   | 0.864      |
|             |       | SG   | Kruskal-Wallis   | 0.181      |
|             | IBAL  | MY   | Kruskal-Wallis   | 0.581      |
|             |       | SG   | Kruskal-Wallis   | 0.770      |
| **vibrant** | APPR  | MY   | Kruskal-Wallis   | 0.580      |
|             |       | SG   | Kruskal-Wallis   | 0.314      |
|             | UNDR  | MY   | Kruskal-Wallis   | **0.028**  |
|             |       | SG   | Kruskal-Wallis   | 0.146      |
|             | CLAR  | MY   | Kruskal-Wallis   | 0.882      |
|             |       | SG   | Kruskal-Wallis   | 0.545      |
|             | CONN  | MY   | Kruskal-Wallis   | 0.278      |
|             |       | SG   | Kruskal-Wallis   | 0.969      |
|             | IBAL  | MY   | Kruskal-Wallis   | 0.311      |
|             |       | SG   | Kruskal-Wallis   | 0.875      |
| **monotonous** | APPR | MY   | Kruskal-Wallis   | **0.014**  |
|             |       | SG   | Kruskal-Wallis   | 0.312      |
|             | UNDR  | MY   | Kruskal-Wallis   | **0.0001** |
|             |       | SG   | Kruskal-Wallis   | **3e-07**  |
|             | CLAR  | MY   | Kruskal-Wallis   | 0.787      |
|             |       | SG   | Kruskal-Wallis   | 0.889      |
|             | CONN  | MY   | Kruskal-Wallis   | 0.469      |
|             |       | SG   | Kruskal-Wallis   | 0.831      |
|             | IBAL  | MY   | Kruskal-Wallis   | 0.409      |
|             |       | SG   | Kruskal-Wallis   | 0.761      |