

Research note

Comparing English and Russian humour perceptions through statistical signature analysis

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Abstract

Signature analysis is a statistical technique introduced in the 1940s in order to identify groups of statistical measures to identify aircraft from radar reflections. Other applications include particle identification in nuclear physics and dark matter location in astrophysics. Humour appreciation, or funniness scores, are empirical measures of perceived humour. Two questionnaires, one in English, the other its translation into Russian, were made available online. Each had 96 humorous sentences or jokes. The sentences were classified empirically according to four age trends. Signatures of the four classes of sentences are calculated from participant scores in six age groups. The original scores will be available to researchers for verification and further investigation from either author. The use of signature analysis in this work involves the comparison of a sentence profile with the signature of its class or category; if the profile meets a strict criterion of errors then it can be described as a best predictor of its class. One notable finding from signature analysis is the existence of offsets: displacement of a sentence profile from its type signature. We suggest that offset values are direct measures of humorousness without reference to context. In this analysis, the profiles of the Russian and English sentences are compared to each other and their graphical differences are interpreted including offsets.

Keywords: humour, cybernetics, signature analysis, English, Russian.

1. Introduction

Humour research has been highly dependent on subjective a priori judgment for classification; a widely cited early work (Schmidt-Hidding 1963) demonstrated a priori classification of comic styles of sentences or artefacts. The style categories included identifiers such as humour, wit, irony, satire, etc. Later works used different classifications, yet still classified humorous sentences a priori. For example, Craik et al. (1996) used dichotomy classifications of socially warm vs. cold, reflective vs. boorish, etc. Mueller and Ruch (2011) followed a system of scales such as mockery, playfulness and sarcasm. Martin et al. (2003) followed contextual classification of their Humour Styles Questionnaire (HSQ) items by their intentions. The HSQ analysis depends on a priori interpretation on two levels: the first in selecting descriptions of behaviours to indicate the essences of typical intentions, the second level is in selecting items (including sentences) of typical humour styles as either self-assuring, aggressive, affiliative or self-defeating in their intentions. The classification of Martin et al. has a high utility value since it identifies “good” or beneficial and “bad” or harmful humour in a therapeutic sense. Yet, the classification is undeniably partial because it does not cover humour outside the description of its four categories.

Ruch (2012: 68) emphasized the importance of an all-inclusive approach to humour research: “no matter how restricted or broad we define the sense of humor, we will need to investigate the entire field of humor related traits and study their interrelations.”

The signature analysis approach to humour research is both general in its coverage and empirical in its methodology (Kadri 2013; 2014; 2015). It is general because the classification is based on the funniness scores of sentences, irrespective of the authors’ assessment of its humour content. The approach is empirical because sentence age trends are computed from score averages of all participants. Perhaps more significantly, while earlier approaches did not see much age dependent changes, the signature analysis approach is built entirely on age dependence; its four categories are defined in terms of sentence age trend in adulthood (Kadri 2015).

This work contains a comparison between two runs of online funniness questionnaires. The first run was in English, ran from January 12, 2009 to September 30, 2010 and attracted 277 participants. The second was a Russian translation of all but four lines. The four could not be re-stated meaningfully in Russian and were replaced by common Russian jokes. The Russian questionnaire ran from October 15, 2015 until May 16, 2016 and attracted 213 participants. The basis of comparison is the categorization of humorous sentences according to their age trend signatures. The significance of four mistranslated sentences is in lowering the count of matching sentences; only 92 of the 96 jokes can be used for the comparison.

The purpose of the study is to demonstrate what is possible to achieve in non-verbal comparison of sentences in different languages using the new tool of signature analysis. The analysis as a non-verbal investigation does not separate text or linguistic structures and cultural influences from funniness scores. Raw scores are available from the authors of this study to researchers for verification and further development. The original research was published in 2015, under the title “The Cybernetics of Humor” and is available online: <http://www.artificialpsychology.com/>”.

First, we will explain relevant aspects of signature analysis to this study, then we will compare the profiles of selected sentences and explain the differences between English and Russian perceptions.

2. Computing signatures

Humour signatures were computed entirely from funniness scores in earlier works (Kadri 2014; 2015). The participant raw scores are scaled first; this has the effect of removing score dependence on the mood of the participant, and only differential scores are used in the computation. Another scaling takes place over age groups; this is done in order to make direct comparisons across age groups using a common Y axis scale of standard deviation. Only then are the signatures and age trend profiles computed.

The four signatures of the Age Trend Classification (ATC) are calculated and compared with the age profiles of sentences in their class. The four adult age trends are constant, falling, peaking and rising scores. The signatures comprise the averages and variances of the six age groups, so that we have four ensembles of average points and their variances, known as the Cramér-Rao lower bounds (Das Gupta 1994).

Figure 1 shows the signatures of English and Russian language sentences based on age trend classification. Age groups in all graphics are indicated on the x-axis scale as: 15 years and below indicated as 15, 16-25 as 16, 26-35 as 26, 36-45 as 36, 46-55 as 46 and over 55 as 55. An obvious feature is the higher appreciation of English speakers for falling trend (including aggressive/sarcastic) jokes and the reverse for peaking trend (including affiliative) jokes.

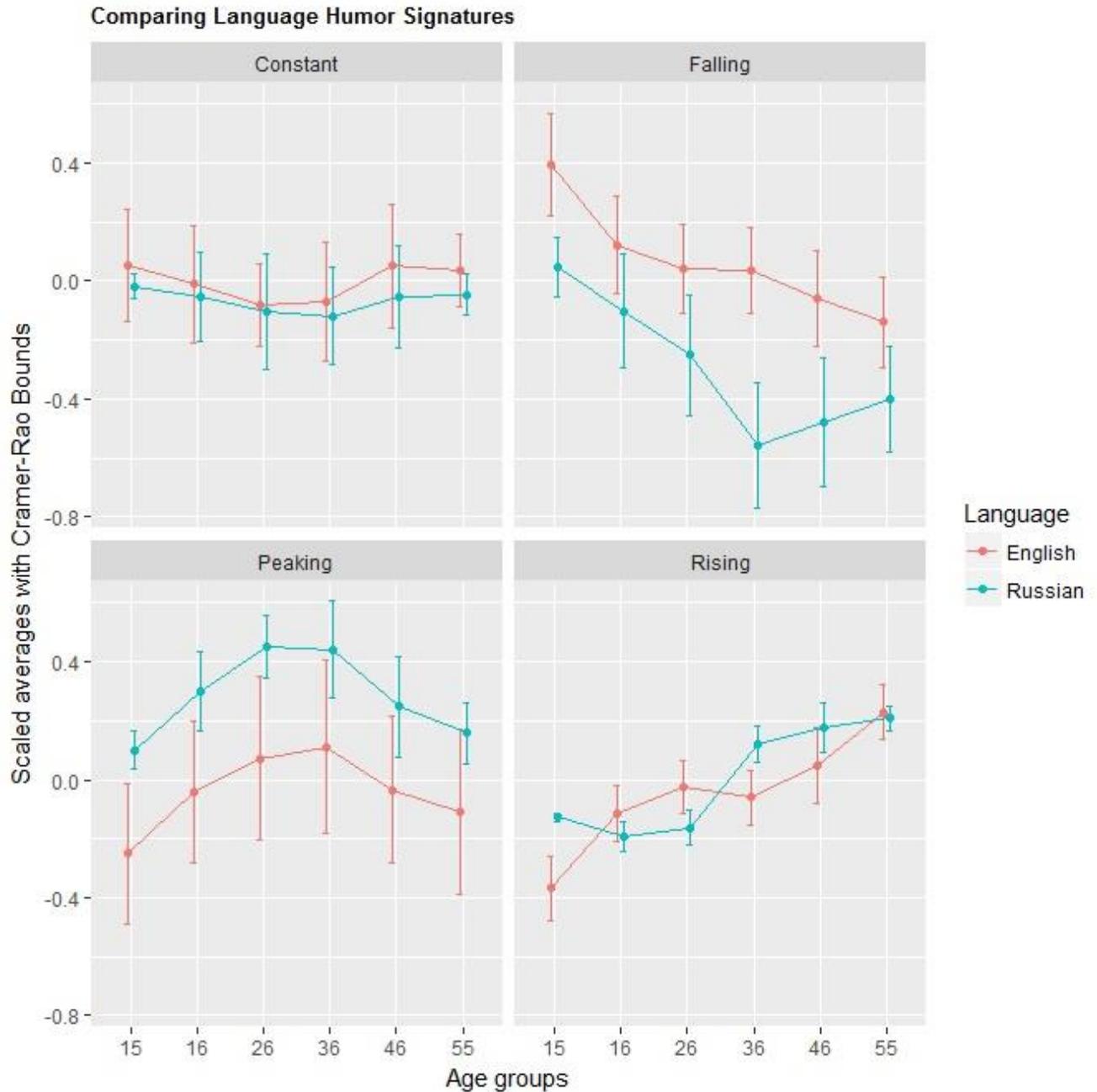


Fig. 1 Age trend signatures of English/Russian language sentences with Cramér-Rao bounds

Overall agreement between English and Russian categorization was significant; there were, in total, 34 out of 92 matching sentences, or about 37% of each category, with the same classification in English and Russian. Considering a random agreement would be 23 out of 92 categories (0.25 probability or 92 divided by 4 random categories), the binomial test quantifies the significance at the 0.98 level. Or one language categorization is substantially similar to the other. However, signature analysis shows more details and significant agreement. The graphics will demonstrate classification matches and mismatches in each ATC category.

The graphics show that many sentence profiles contain offsets. An offset in reference to statistical signature analysis is equal displacements from type signature to a substantial number of profile points. The displacement can be positive or negative, indicating a higher or lower average score.

Profile compliance, or matches, of the sentences and their translation will also be identified graphically. It is clear that the offset of a profile and the closeness of a signature fit are two separate entities; since offsets apply equally to all age groups, they may correspond to a common sense measure of humour, while signature fit is an indication of conformity to the classification and relates to changes in the perception of humour between age groups. The ensuing comparison will be based on the separation of the two aspects: offset and signature conformity.

The compliance of a profile with its type signature may be identified graphically. The authors identified compliance categories by inspection, but there is no reason why this process cannot be automated using quantitative criteria. A profile is identified as either complying with its category signature (with or without offset over most age groups) or fitting two different offsets or two different signatures, or graphically non-compliant as one or two age groups with any signatures. Tables one and two below show English and Russian distributions of signature compliance as identified graphically.

Table 1. English sentences signature compliance distribution

Sig Fit	Smooth	Jagged	Split	No Fit	sums
Constant	11	7	3	3	24
Falling	17	9	1	2	29
Peaking	9	4	2	2	17
Rising	12	6	3	5	26
Totals	49	26	9	12	96

Table 2. Russian sentences signature compliance distribution

Sig Fit	Smooth	Jagged	Split		No Fit	sums
Constant	12	11	6		4	33
Falling	11	8	2		0	21
Peaking	11	8	4		2	25
Rising	7	7	2		1	17
Totals	41	34	14		7	96

The questionnaires contained 96 humorous sentences each, so that 96 profiles are calculated for each language. The sentence profile is the line connecting its average scores of six age groups. The profiles are categorized according to their age trend. The sentences with high funniness scores from young participants that gradually declined with age were classified in the falling trend category. Sentences which increased in their funniness scores with age were classified as the rising category. The third category sentences peaked at around 33 years of age and the fourth remained somewhat constant.

The distribution of English speaking membership for constant/falling/peaking/rising classes was 25/30/13/28 respectively. The Russian speakers were distributed at 35/19/26/16. Notice that this classification is completely empirical; it does not depend on subjective interpretations or a priori judgment of any kind, and the classes are limited to four (Kadri 2013). The subjective interpretations of Martin et al. (2003) define sub-groups which belong to age trend classes, e.g. aggressive jokes are part of the falling trend but do not constitute the whole class. This means that the age trend classes are context free as a whole but contain interpreted types.

There was significant conformity of fit in the distribution of the sentences, especially in the falling and rising categories. We selected two sentences from each category in order to illustrate signature analysis: one of agreement or match, the other of disagreement or mismatch of ATC assessment between the languages. Mismatch sentences are back-translated from Russian back into English only when there is a significant difference in translation in order to demonstrate a graphical effect.

The choice of a total of 8 sentences as examples has no significance other than the practical length of the paper; a larger sample may not demonstrate new capability.

Here are the examples by line number and their classification:

- 4. A dwarf wanted to commit suicide so he jumped off the curb. Falling.
- 6. Diplomacy is the art of telling someone to go to hell in such a way that he looks forward to the trip. Peaking.
- 8. A child's wisdom: Remember you're never too old to hold your father's hand. Constant.
- 18. Sign at the office of a Roman doctor: Specialist in women and other diseases.
- 30. A person who smiles in the face of adversity probably has a scapegoat.
- 44. Some people are only alive because it is illegal to shoot them.
- 45. Better to understand a little than to misunderstand a lot. Rising.
- 46. Sign in Turkey: The government bans the smoking of children.

And their translation:

- 4. Гном хотел покончить жизнь самоубийством и прыгнул вниз с поребрика.
- 6. Дипломатия – это искусство посылать человека нафиг так, чтобы он предвкушал это путешествие.
- 8. Детская мудрость: Ты никогда не будешь слишком взрослым, чтобы не держать отца за руку.
- 18. Надпись на кабинете Римского врача: специалист по женщинам и другим заболеваниям.
- 30. У человека, который улыбается перед лицом опасности, скорее всего есть козел отпущения.

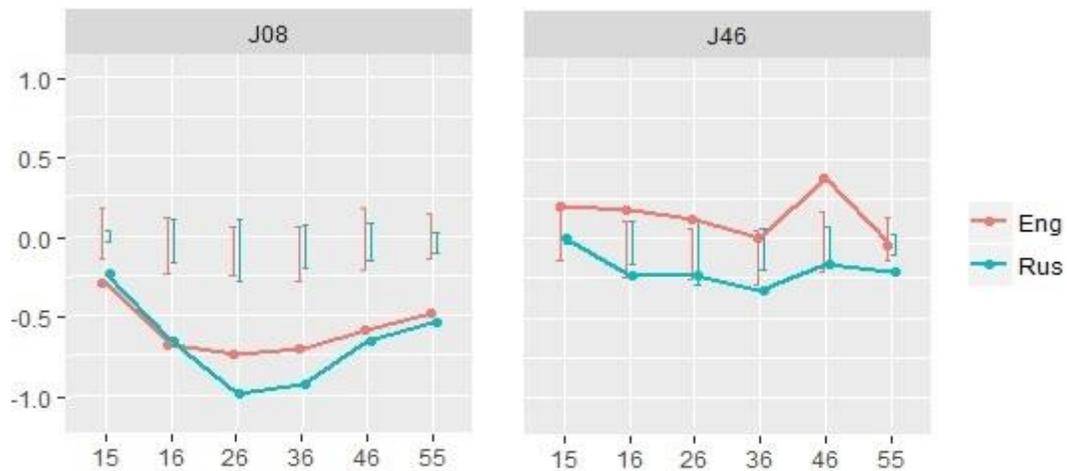


Figure 2. Constant age trend examples

Figure 2 shows that the profiles and signatures of sentences 8 and 46 are classified as having constant age trends. The x-axis shows six age groups: 15 and below (15), 16-25 (16), 26-35 (26), 36-45 (36), 46-55 (46) and over 55 (55) years old. The Y-axis reads in standard deviation (sigma) units. All scales are the same for figures 2-5. Sentence 8 is an example of the same categorization in English and Russian with similar offsets. Therefore, we can assume a similar perception of meaning in English and Russian, fitting well in the context of self-assurance. Sentence 46 is an example of mismatch, where English has constant classification and positive offset while Russian classifies as falling age trend and negative offset. The mismatch suggests perception in self-assurance context in English but maybe perception of aggression and evaluation as bad humor in Russian. In back-translation the Russian sentence becomes:

Ad in Turkey: children are not allowed to smoke. Clearly there is difference in meaning which could explain the mismatch in profile fit.

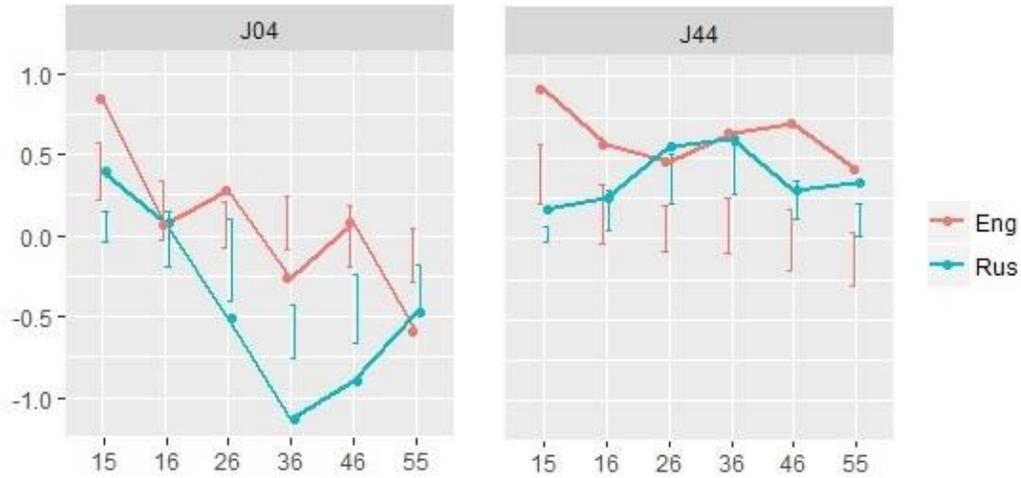


Figure 3. Falling age trend examples

Sentences with falling age trend include aggressive interpretations appreciated by young age groups but not by older participants. Figure 3 illustrates wider linguistic/cultural differences; sentence 4 illustrates a matching classification and shows changes by 1.5 standard deviations for both languages. However, older Russian participants in age groups of 46 and up recover humorousness appreciation, which indicates that adults at the time of the former Soviet Union appreciate aggressive-sarcastic humour more than what is expected for their age at present. Sentence 44 illustrates mismatch since it is classified as falling by English speakers but peaking by the Russians, suggesting that Russian participants may not have seen aggression as the English did. Sentence 44 back-translates fairly accurately as: Some people are only alive because the law forbids shooting them.

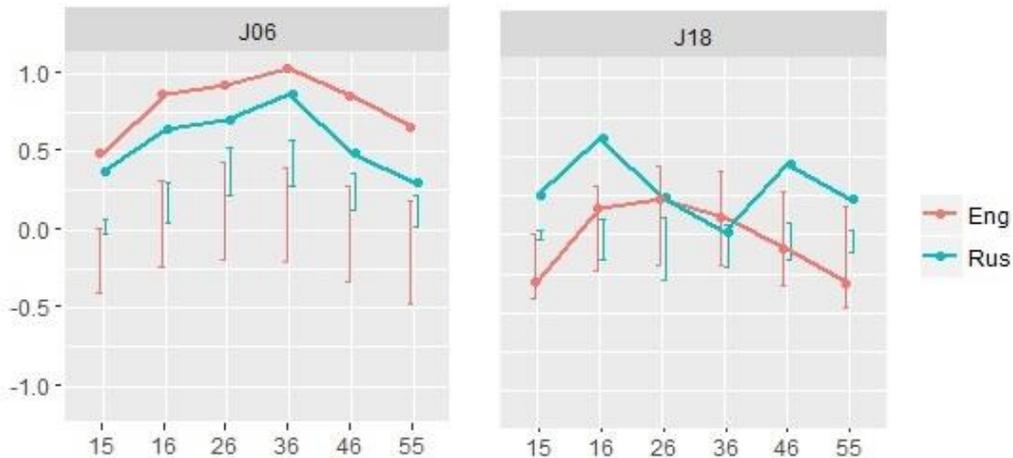


Figure 4. Peaking age trend examples

In Figure 4, sentence 6 shows a matching classification in peaking age trend between the two languages; both languages are offset positively, more so by English speakers. This suggests that the appreciation of humour was slightly less in Russian. Here, the spread of the English signature is noticeably wider than in Russian, suggesting diversity of perceptions among English speakers. Sentence 18 mismatches where English speakers classify peaking while Russian speakers classify constant and with higher appreciation. The back-translated sentence is literally identical to the original English language sentence 18. Peaking suggests affiliative context, or problematic transmission of meaning, while constant classification suggests a self-assurance context; perhaps a sexist perception which agrees with the premise of the humorous sentence.

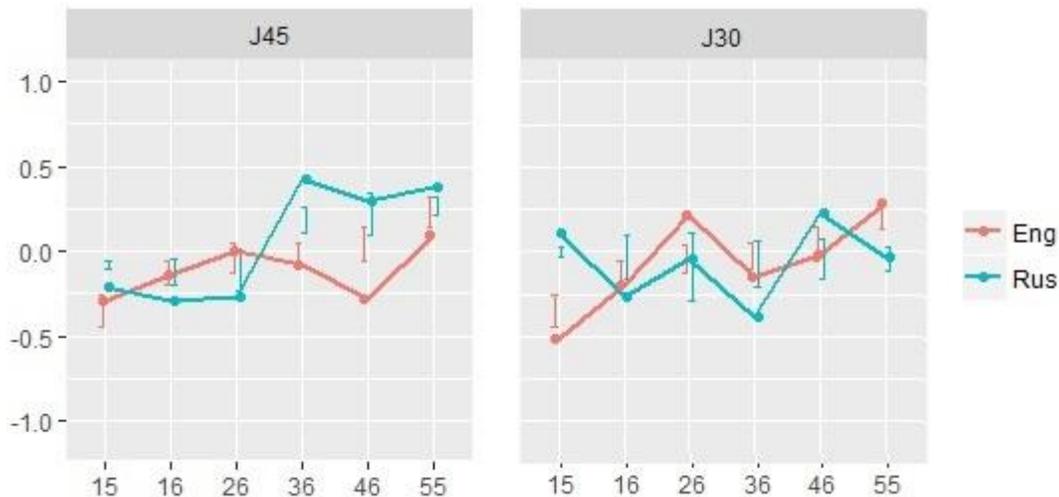


Figure 5. Rising age trend examples.

Rising trend signatures show less change than the falling category (about 0.5 standard deviation in falling). Sentence 45 illustrates matching in the falling category, but the humour is appreciated more in Russian by older participants, and shows a slight upturn in the scores of young Russians, suggesting young Russian participants appreciate self-defeating jokes more than their English-speaking counterparts. Sentence 30's mismatch was classified as a constant age trend in Russian, suggesting self-assurance perception rather than self-defeat as in the falling category. Back-translation is very similar: A person who smiles in the face of danger most likely has a scapegoat.

3. Discussion

This work is an inductive investigation of the power of signature analysis as a statistical tool. The graphs are descriptive statistics and so, this tool complements, but does not replace classical tests.

An inspection of profile/signature comparisons reveals remarkable language/cultural differences in perception such as: Overall wider Cramér-Rao bound with the Russian language data, most notably in rising and falling age trend classes. A contributing factor may be a wider dispersion of Russian data. We observe that the number of Russian sentences are fewer than their English counterparts in rising

and falling categories: 19/16 Russian falling/rising sentences vs. 30/28 for English respectively. This may also contribute to wider spreads of the Russian language data.

The English falling and rising signatures have somewhat steady fall and rise age trends, while the corresponding Russian signatures have older age tails in the opposite direction. This signifies generational discontinuity in the perception of humour between young and old Russians starting from age 36-45

Following established contextual interpretations associated with age trends (Kadri 2011; Martin et al. 1996), a rising tail with falling class signature indicates higher appreciation of aggressive humour by older Russian participants, perhaps a preference for sarcasm not typical for their age. While rising humour signature has a smaller tail with the youngest age groups, signifying appreciation of self-defeating humour, perhaps the younger Russian participants have an atypical appetite for older folks' humour, or maybe young Russians are laughing at the old!

What makes the Russian generational discontinuity even more noteworthy is the geographical distribution of the participants; mainly from Russia and the former Soviet Union republics, while the English language scores had wider worldwide participation, from the Indian subcontinent, Europe and the U.S. Yet, the English language geographical spread did not lead to wider data spreads of the signatures.

4. Conclusions

Signature analysis allows the comparison between funniness scores while separating a measure of humorousness from compliance with the signature classification. This makes it possible to make direct comparisons in the perception of humour between two sets of participants, in this case, between English and Russian speakers using online funniness questionnaires.

The comparison revealed significant differences in the perception of 96 sentences; Russian language scores have wider spread than the English, despite the wider geographical spread of English language participants. Atypical Russian scores of falling and rising age trend sentences; older Russians finding aggressive jokes funny, more typical of the young, and, to a lesser extent, younger Russians finding jokes with older taste funny. Another observation: some highly appreciated English jokes indicated by large profile offsets were not so appreciated when translated into Russian. This work also revealed that signature analysis offers the means to quantitatively measure the loss in translation in numerical standard deviation (sigma) units.

In moving forward, signature analysis could reveal much more than the graphical information investigated in this work; performance of statistical tests, validation of the age trend categorization and comparison with other classifications, coherence of age group scores, contextual perception of age groups and individuals and links to psychometric personality models.

There is a wealth of possibilities to be explored using the tools of signature analysis. Certainly, in all cases, more participation is required to confirm the preliminary findings of this exploratory analysis.

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