Occupational gender bias in ungendered languages: Comparing experimental data from Hungarian and Chinese

Anonymous ACL submission

Abstract

This paper is about occupational gender bias and stereotypes, presented in a cross-cultural setting. In the study, we analyze experimental data collected from Hungarian and Chinese speakers on their ratings of occupational titles, answering a question on how typically a job is done by either men or women. Results show that in both of these languages the words carry societal biases, despite that the job titles themselves have no gender markings. We compare the ratings across linguistic and participant gender lines, highlight the differences, and discuss the results with insights ranging from peculiarities in word formation to more generic societal differences. We also compared the human raters' responses with that of a few popular generative AI engines, which will show that the biases we humans carry are even stronger in the Large Language Models (LLMs) underlying these chatbots.

1 Introduction

2 Experiment setup

For both languages we devised a simple experiment in survey form, where we asked participants to rate job titles on a 7-point Likert scale. In both cases they were instructed to make decisions on how likely that occupation is to be done by men or by women, according to their own perception. The exact wording in translation were: HU: "Is the occupation typically a man's occupation or a woman's occupation?"; ZH: "What do you think is the ratio of men to women in `occupation_name`?". The scale presented in both questionnaires followed the same logic, from -3 to +3, moving from men to women, with 0 in the middle, hence the choices were completely male (-3); mostly male (-2); somewhat male (-1); neutral/equal (0); somewhat female (+1); mostly female (+2); completely female (+3). First, we will introduce the Hungarian survey, then the Chinese one, and finally we will compare the results of the two.

2.1 Hungarian survey

2.1.1 Materials

The Hungarian survey contained 50 items, each a commonly occurring job title in Hungary, such as: *modell* 'model' or *katona* 'soldier', in no particular order. Six of the words were attention-check items, which were removed from the final analysis. The attention checks were *pincérnő* 'waitress', *titkárnő* 'secretary (female)', *tanárnő* 'teacher (female)', *takarítónő* 'cleaning lady', *ápolónő* 'nurse (female)', and *házvezetőnő* 'housekeeper (female)'. These words explicitly determine the gender of the worker by appending *-nő* 'woman' to the base word. If participants paid attention, all these items should be rated according to 'completely female' (3). Participants who rated any of these lower than 2, or rated it lower than 3 more then once were rejected.

These words above have also have their counterparts without the suffix, *pincér* 'waiter', *titkár* 'secretary', *tanár* 'teacher', etc., these are unmarked for gender. Common pairs include *énekes* 'singer' – *énekesnő* 'female singer', *színész* 'actor' – *színésznő* 'actress', and in such cases where both are well established, the unmarked word seems to have some male bias, but it does not explicitly refer to a man. More interestingly, there are occupations where the unmarked form is the only one generally used for both genders, and appending *'-nő* 'woman' to it – although possible – would render it a bit awkward, such as in *alkalmazottnő* 'female employee' or *programozónő* 'female programmer', but not impossible such as English *singress* would be. Furthermore, there are a few cases, where the female-marked version is so widespread, that it is the unmarked version that will sound odd, such as *házvezető* 'housekeeper', or to some extent *takarító* 'cleaner'.

In short, we are interested in these unmarked words, as they do not inherently carry a male bias, but according to our expectations will nontheless be rated according to the prevailing societal stereotypes.

We also included *diák* 'student' out of curiosity. Although being a student is not a job, but it is beyond doubt the only truly gender-neutral "occupation" there is, since it is mandatory for every child to go to school both in Hungary and in China. We wanted to see if there would be would be any bias regarding this word, especially that Hungarian has a female form for it, *diáklány* 'girl student'.

2.1.2 Procedure

The questionnaire was distributed online, and after a brief welcome message and the instructions, the words were presented in a simple list format, each word with a corresponding rating scale next to it, with no context. Time limit was not set, but the survey was designed to take around 5 minutes; participants took 4 minutes 25 seconds on average to finish.

2.1.3 Participants

A total of 22 native Hungarian speakers filled the questionnaire, and after validating the responses (reviewing attention checks and manual checking for anomalies) 2 were rejected. The participants were mostly recruited through Prolific, an online platform, with screeners for current location (Hungary) and first language (Hungarian). Participants were compensated for their time with a small reward. In the end, the Hungarian rating dataset had 20 participants (11 female, 9 male), with ages ranges of 25-35 (n=11), 35-45 (n=4), and 45-55 (n=5). See Figure 1 for the distribution.
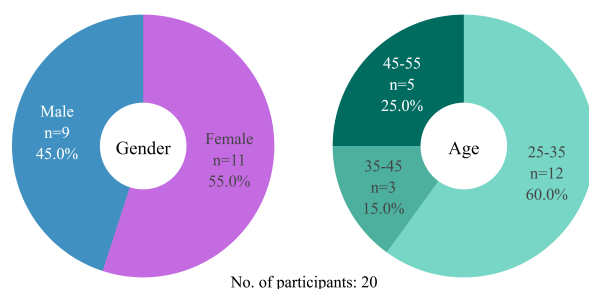

Figure 1: Demographics of the Hungarian participants.

3 Mandarin Chinese survey

4 Results & Analysis

...overall

4.1 Hungarian

The Hungarian data was first analyzed using a one-sample T-test to determine if the mean ratings for each occupation were significantly different from 0 (neutral). The results showed that a majority of occupational titles were rated with a significant gender bias, with 37 out of 44 occupations showing significant bias. See Figure 2 for a visualization of the mean ratings.

4.2 Chinese

4.3 Cross-linguistic comparison

5 Experiment design

6 Introduction

These instructions are for authors submitting papers to *ACL conferences using LaTeX. They are not self-contained. All authors must follow the general instructions for *ACL proceedings,[1] and this document contains additional instructions for the LaTeX style files.

The templates include the LaTeX source of this document (`acl_latex.tex`), the LaTeX style file used to format it (`acl.sty`), an ACL bibliography style (`acl_natbib.bst`), an example bibliography (`custom.bib`), and the bibliography for the ACL Anthology (`anthology.bib`).

7 Engines

To produce a PDF file, pdfLaTeX is strongly recommended (over original LaTeX plus dvips+ps2pdf or dvipdf). The style file `acl.sty` can also be used with luaLaTeX and XeLaTeX, which are especially suitable for text in non-Latin scripts. The file `acl_lualatex.tex` in this repository provides an example of how to use `acl.sty` with either luaLaTeX or XeLaTeX.

8 Preamble

The first line of the file must be

```
\documentclass[11pt]{article}
```

To load the style file in the review version:
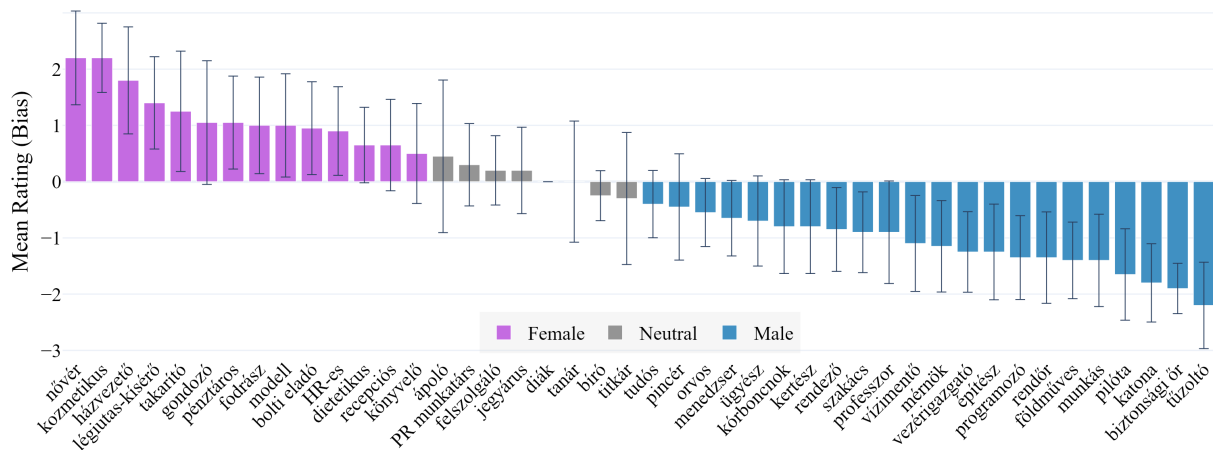
---

[1] http://acl-org.github.io/ACLPUB/formatting.html

Figure 2: Mean ratings of occupational titles in Hungarian: [Interactive plot](#).

\usepackage[review]{acl}

For the final version, omit the review option:

\usepackage{acl}

To use Times Roman, put the following in the preamble:

\usepackage{times}

(Alternatives like txfonts or newtx are also acceptable.)

Please see the LaTeX source of this document for comments on other packages that may be useful.

Set the title and author using \title and \author. Within the author list, format multiple authors using \and and \And and \AND; please see the LaTeX source for examples.

By default, the box containing the title and author names is set to the minimum of 5 cm. If you need more space, include the following in the preamble:

\setlength\titlebox{<dim>}

where <dim> is replaced with a length. Do not set this length smaller than 5 cm.

9 Document Body

9.1 Footnotes

Footnotes are inserted with the \footnote command.[2]

9.2 Tables and figures

See Table 1 for an example of a table and its caption. **Do not override the default caption sizes.**

---

[2]This is a footnote.

Command	Output	Command	Output
{\"a}	ä	{\c c}	ç
{\^e}	ê	{\u g}	ğ
{\`i}	ì	{\l}	ł
{\.I}	İ	{\~n}	ñ
{\o}	ø	{\H o}	ő
{\'u}	ú	{\v r}	ř
{\aa}	å	{\ss}	ß

Table 1: Example commands for accented characters, to be used in, *e.g.*, BibTeX entries.

As much as possible, fonts in figures should conform to the document fonts. See Figure 3 for an example of a figure and its caption.

Using the graphicx package graphics files can be included within figure environment at an appropriate point within the text. The graphicx package supports various optional arguments to control the appearance of the figure. You must include it explicitly in the LaTeX preamble (after the \documentclass declaration and before \begin{document}) using \usepackage{graphicx}.

9.3 Hyperlinks

Users of older versions of LaTeX may encounter the following error during compilation:

\pdfendlink ended up in different nesting level than \pdfstartlink.

This happens when pdfLaTeX is used and a citation splits across a page boundary. The best way to fix this is to upgrade LaTeX to 2018-12-01 or later.

Output	natbib command	ACL only command
(Gusfield, 1997)	\citep	
Gusfield, 1997	\citealp	
Gusfield (1997)	\citet	
(1997)	\citeyearpar	
Gusfield's (1997)		\citeposs

Table 2: Citation commands supported by the style file. The style is based on the natbib package and supports all natbib citation commands. It also supports commands defined in previous ACL style files for compatibility.

Figure 3: A figure with a caption that runs for more than one line. Example image is usually available through the `mwe` package without even mentioning it in the preamble.

9.4 Citations

Table 2 shows the syntax supported by the style files. We encourage you to use the natbib styles. You can use the command \citet (cite in text) to get "author (year)" citations, like this citation to a paper by Gusfield (1997). You can use the command \citep (cite in parentheses) to get "(author, year)" citations (Gusfield, 1997). You can use the command \citealp (alternative cite without parentheses) to get "author, year" citations, which is useful for using citations within parentheses (e.g. Gusfield, 1997).

A possessive citation can be made with the command \citeposs. This is not a standard natbib command, so it is generally not compatible with other style files.

9.5 References

The LaTeX and BibTeX style files provided roughly follow the American Psychological Association format. If your own bib file is named custom.bib, then placing the following before any appendices in your LaTeX file will generate the references section for you:

    \bibliography{custom}

You can obtain the complete ACL Anthology as a BibTeX file from https://aclweb.org/anthology/anthology.bib.gz. To include both the Anthology and your own .bib file, use the following instead of the above.

    \bibliography{anthology,custom}

Please see Section 10 for information on preparing BibTeX files.

9.6 Equations

An example equation is shown below:

$$A = \pi r^2 \tag{1}$$

Labels for equation numbers, sections, subsections, figures and tables are all defined with the \label{label} command and cross references to them are made with the \ref{label} command.

This an example cross-reference to Equation 1.

9.7 Appendices

Use \appendix before any appendix section to switch the section numbering over to letters. See Appendix A for an example.

10 BibTeX Files

Unicode cannot be used in BibTeX entries, and some ways of typing special characters can disrupt BibTeX's alphabetization. The recommended way of typing special characters is shown in Table 1.

Please ensure that BibTeX records contain DOIs or URLs when possible, and for all the ACL materials that you reference. Use the `doi` field for DOIs and the `url` field for URLs. If a BibTeX entry has a URL or DOI field, the paper title in the references section will appear as a hyperlink to the paper, using the hyperref LaTeX package.

Limitations

Since December 2023, a "Limitations" section has been required for all papers submitted to ACL Rolling Review (ARR). This section should be
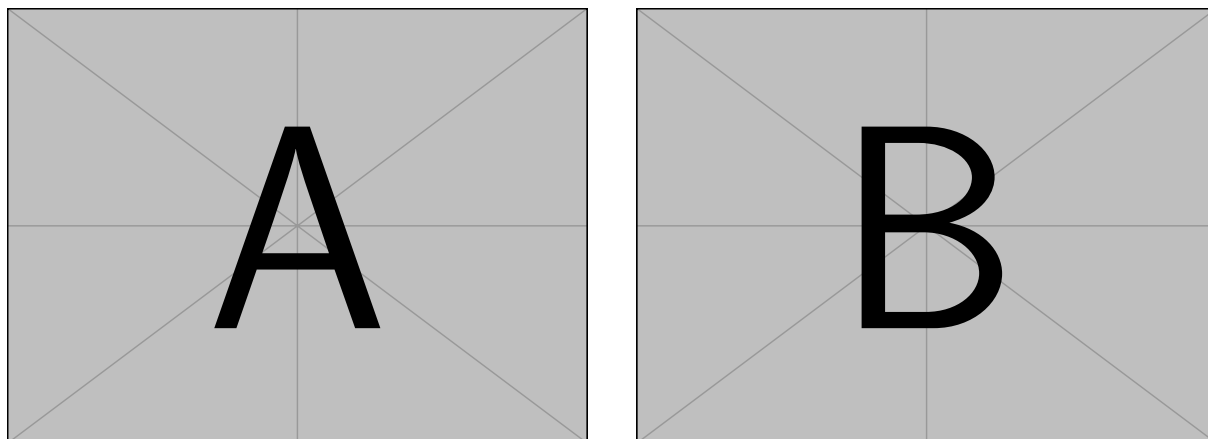
Figure 4: A minimal working example to demonstrate how to place two images side-by-side.

placed at the end of the paper, before the references. The "Limitations" section (along with, optionally, a section for ethical considerations) may be up to one page and will not count toward the final page limit. Note that these files may be used by venues that do not rely on ARR so it is recommended to verify the requirement of a "Limitations" section and other criteria with the venue in question.

Acknowledgments

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References

Rie Kubota Ando and Tong Zhang. 2005. A framework for learning predictive structures from multiple tasks and unlabeled data. *Journal of Machine Learning Research*, 6:1817–1853.

Galen Andrew and Jianfeng Gao. 2007. Scalable training of L1-regularized log-linear models. In *Proceedings of the 24th International Conference on Machine Learning*, pages 33–40.

Dan Gusfield. 1997. *Algorithms on Strings, Trees and Sequences*. Cambridge University Press, Cambridge, UK.

Mohammad Sadegh Rasooli and Joel R. Tetreault. 2015. Yara parser: A fast and accurate dependency parser. *Computing Research Repository*, arXiv:1503.06733. Version 2.

A   Example Appendix

This is an appendix.