

FEMININE WORDS

- 'affectionate'
- 'agree-'
- 'cheer-'
- 'child'
- 'co-operate'
- 'collab-'
- 'commit-'
- 'communal'
- 'communicate'
- 'compassion'
- 'connect'
- 'considerate'
- 'cooperat-'
- 'depend-'
- 'emotion-'
- 'empath-'
- 'enthusias-'
- 'feel'
- 'feminine'
- 'flatter'
- 'gentle'
- 'honest'
- 'inclusive'
- 'interdependen-'
- 'interpersonal'
- 'kind'
- 'kinship'
- 'loyal'
- 'modesty'
- 'nag'
- 'nurture-'
- 'pleasant'
- 'polite'
- 'quiet'
- 'responsible'
- 'sensitive'
- 'share-'
- 'sharin-'
- 'submissive'
- 'support-'
- 'sympathy-'
- 'tender-'
- 'together'
- 'trust'
- 'understand-'
- 'warm'
- 'whin-'
- 'yield'

MASCULINE WORDS

- 'active-'
- 'adventurous'
- 'aggress-'
- 'ambition-'
- 'analytical'
- 'assert-'
- 'athlete-'
- 'autonomy-'
- 'baffle'
- 'boast-'
- 'challenge'
- 'champion-'
- 'compet-'
- 'competent'
- 'competit-'
- 'confident'
- 'courage-'
- 'decid-'
- 'decisi-'
- 'defend'
- 'determin-'
- 'domina-'
- 'driven'
- 'fearless'
- 'fight'
- 'force'
- 'forcible'
- 'greedy'
- 'headstrong'
- 'hierarch'
- 'hostil-'
- 'impulsive'
- 'independen'
- 'individual'
- 'intellect-'
- 'lead-'
- 'logic-'
- 'masculine'
- 'methodical'
- 'objective'
- 'opinion'
- 'outspoken'
- 'persist-'
- 'principle'
- 'reckless'
- 'self-confiden-'
- 'self-sufficient'
- 'selfrelian-'
- 'stubborn-'
- 'superior'
- 'unreasonab-'



Advancing Data Analytics for Decoding Gendered Language in Job Advertisements of STEM Fields



A. Nabong¹, L. Tran², L. Behjat², J. Dengate³, A. Farenhorst⁴

¹ Department of Computer Science, University of Manitoba; ² Department of Electrical and Computer Engineering, University of Calgary
³ Department of Soil Science and Department of Sociology, University of Manitoba; ⁴ Department of Soil Science, University of Manitoba

Background

The underrepresentation of women in STEM (Science, Technology, Engineering, Math) is a complex issue that is influenced by several factors. The 2011 paper, *Evidence that gendered wording in job advertisements exists and sustains gender inequality* (Gaucher et al., 2011), has shown that **word choice** in job advertisements affects not only one's perception of their **fit for the position**, but also how much they feel they **belong** to that field. Gaucher's study documents the effect of **masculine and feminine wording** in advertisements.

Objective

- To analyze job advertisements from the fields of Computer Science, Engineering, and Healthcare using pre-existing **gender decoders** in order to **reveal and compare patterns of language use** in job advertisements
 - Infer their **effect on gender parity in STEM**.

What is gendered wording?

A word is considered **gendered** if it has an **association with a certain gender**, typically male or female.

- Usually **implicit** bias; can contradict a conscious opinion

What is a gender decoder?

- A **gender decoder** is tool that **counts and compares** the number of feminine and masculine words that appear in the given text then **returns a result**
 - Usually "Male", "Female", or "Neutral".
- Every decoder has a curated **word list** that it considers gendered; this list often differs between decoders.
 - Often, these word lists consist of **word stems** in order to **detect a group of words**
 - eg. The word stem "collab", such as in "collaborate", "collaborative", "collaborating"

Method

- Collection of Job Advertisements**
 - Python web-scanning program was developed to **automate the collection** of job advertisements from an online job board.
 - This yielded **~6000 Engineering** (Mechanical, Electrical, Computer) and **~3500 Computer Science** advertisements.
 - Additionally, **~2800 Healthcare** listings were collected to compare a traditionally female-dominated field to the STEM fields.
- Decoding**
 - Five online gender decoders** were selected from a web search.
 - Python program was created to **simulate the decoders' algorithms** and calculate the **result of each** decoder for each collected advertisement
 - The program also recorded **which** gendered word stems appeared in the text, and **how often**.

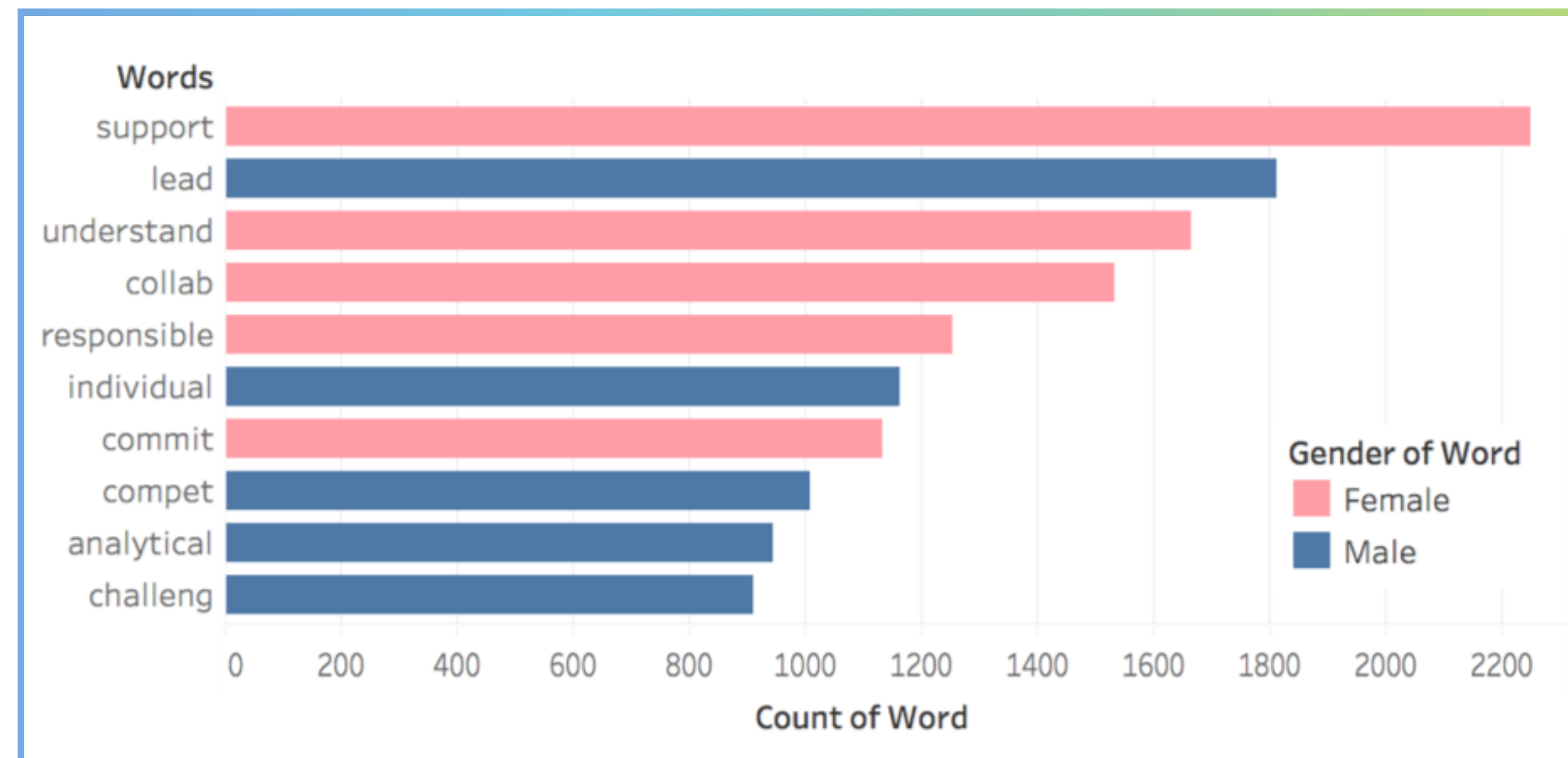


Fig. 1: Most common gendered words stems found in Computer Science advertisements

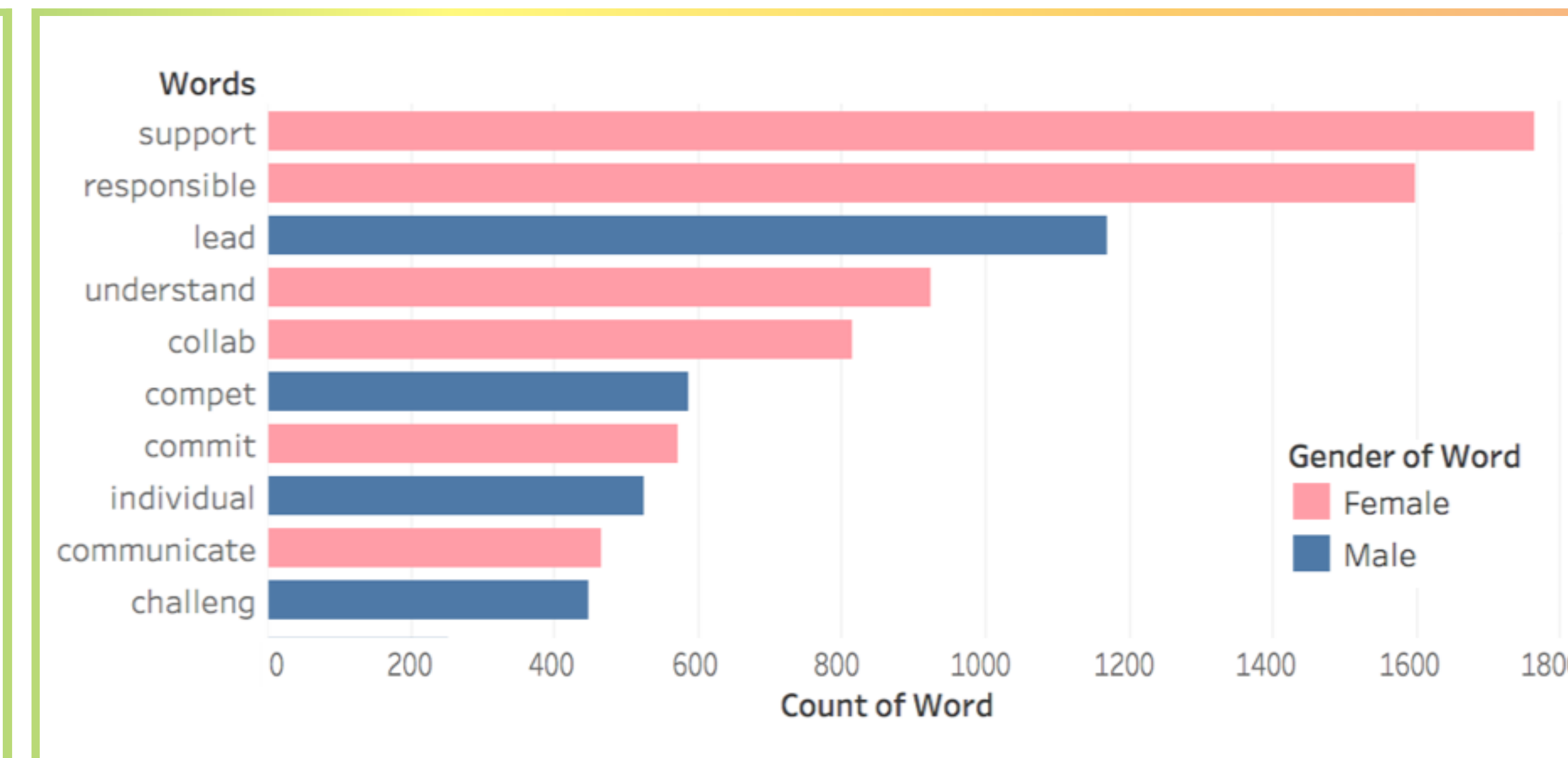


Fig. 2: Most common gendered word stems found in Engineering advertisements

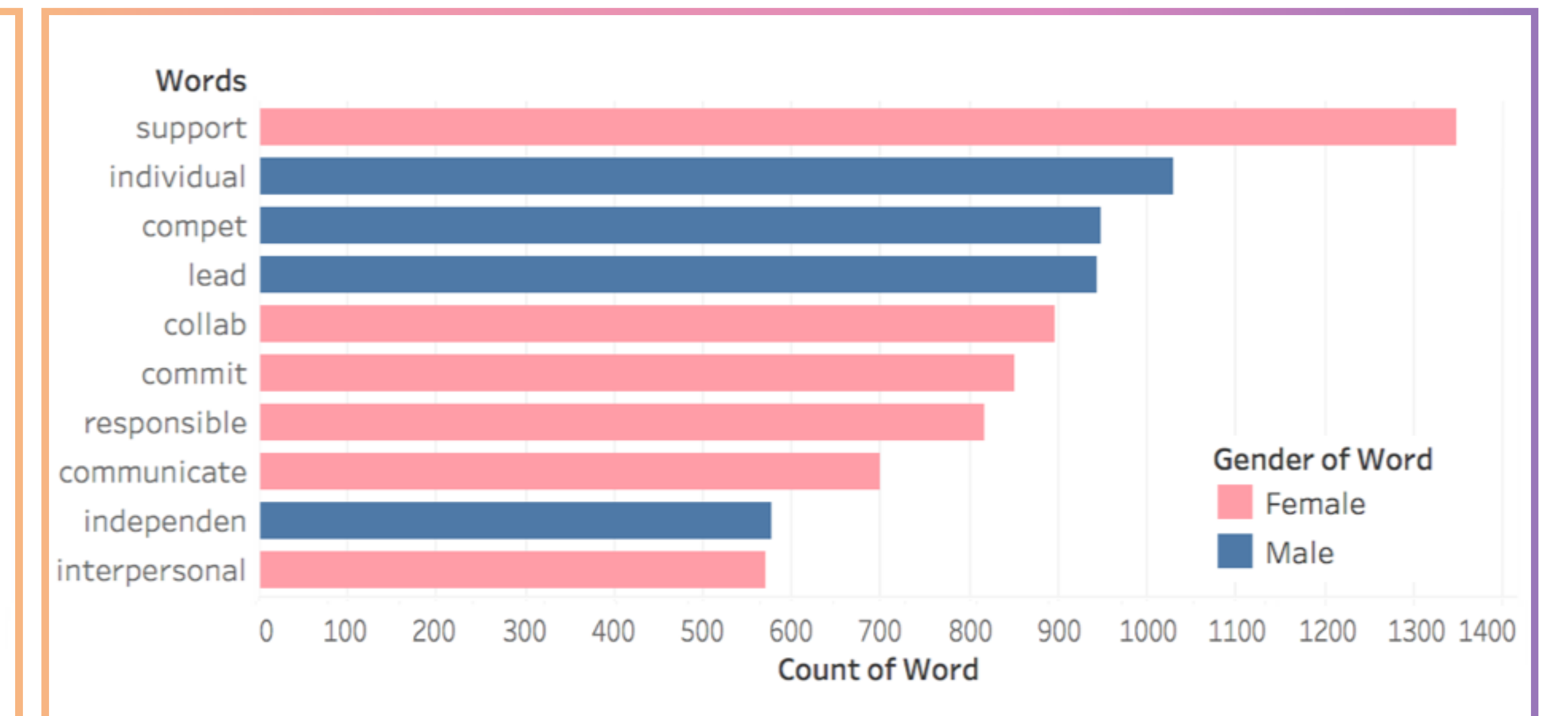


Fig. 2: Most common gendered word stems found in Healthcare advertisements

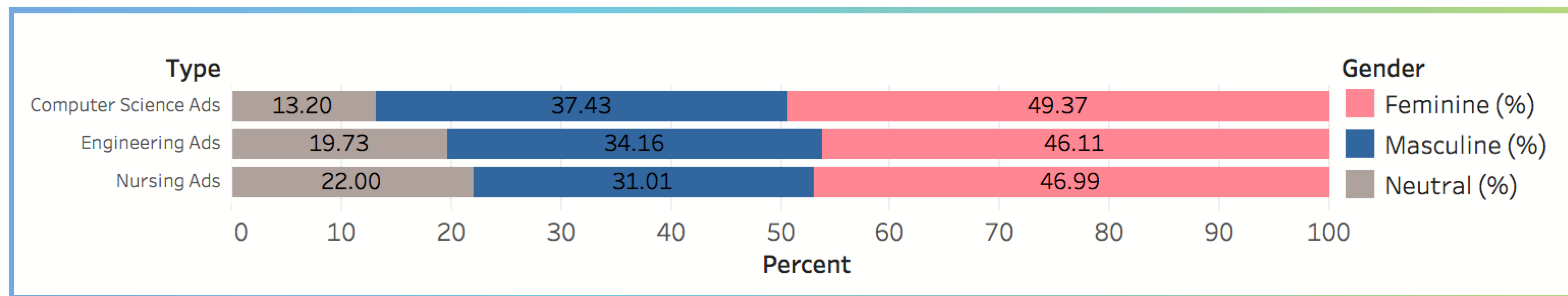


Fig. 4: Percentages of gender results per field

Results

- Overall, **all three field** samples contained **more feminine-coded advertisements** than masculine- or neutral-coded.
- The **most common word stem** in all fields was **"support"**, a feminine word (such as in "supportive", "supporter")
- Four of the five **most commonly used gendered word stems** in the Computer Science and Engineering samples are **feminine** words.

Implications

- More feminine-coded Computer Science and Engineering advertisements could mean that STEM companies are **becoming aware of the effects** of wording on potential applicants
- The **high frequency of feminine words** such as "support" and "collab-" suggest that despite being male-dominated fields, STEM jobs involve **many traditionally feminine qualifications or duties**.

Moving Forward

Next steps include:

- Dividing** each advertisement **into components** (Company Description, Job Responsibilities, Job Qualifications) and calculating the results of each section.
 - To obtain a deeper understanding of **how gendered words are used** in advertisements – see if words are being used in a way that reinforces stereotypes of a gender's competencies
- Creating our own gender decoder** using **machine learning**
 - Consider the **context** of words to determine if they are being used in a "gendered sense" - prevent advertisements from adding gendered words that aren't used in a gendered sense eg. The word "kind" as an adjective means "considerate" (feminine), while as a noun it means "type" (neutral)



Contact: Arienne Nabong
 (nabongma@myumanitoba.ca)

This work was supported by the Natural Sciences and Engineering Research Council of Canada (NSERC), and the Program for Undergraduate Research Experience (PURE) at the University of Calgary.