What do words convey?
A thematic and linguistic analysis of undergraduates’ reasons for choice of major and associations with science motivation

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*Analyses are ongoing and manuscript is in draft. For more information, please contact: nsafavia@uci.edu
INTRODUCTION

- Understanding undergraduates' motives for their STEM major and persistence within the major is complex

- Subject-related values\(^1\) are drivers of decision-making
  - *interest* (enjoyment)
  - *attainment* (personal relevance)

- Values associated with STEM-related course-taking patterns, college majors, and occupational choices\(^2,3,4\)

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- Analytic approaches to studying motivation are broadening

- Social psychologists are studying the links between language, beliefs, and behaviors
  - language reflects psychological disposition, emotionality, cognition\textsuperscript{6,7,8,9}
  - patterns of language use can be an indication of motivation\textsuperscript{10,11}

- Studying students' language use, in their self-generated explanations for major choice, may yield insights into psychological construction of motivation for their STEM major
RESEARCH QUESTIONS

1. How do undergraduates enrolled in a gateway chemistry course articulate their reasons for their declared major, in terms of...
   a) prevalent content themes, and
   b) linguistic features (word count, use of affective words)?
   1b. Are there differences by gender or type of STEM major?

2. Are their chemistry-related motivational beliefs (affective and behavioral interest and attainment value) associated with their articulation of major choice, in terms of...
   a) content themes, and
   b) linguistic features (word count, use of affective words)?

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STUDY SAMPLE

- 503 freshmen students in gateway Chemistry course
  - Large public Hispanic- and Asian- serving university in Southern California
  - 69% female
  - 56% First-generation college-going
  - 37% Hispanic, 22% Southeast Asian, 19% East Asian

- Surveyed online at the beginning of a 10-week term
  - Socio-demographic: gender, race, and parent education

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MAJOR CHOICE

Open-ended Items
- Current (or expected) major
  - “What is your major (or your expected major)?”
- Explain why they chose that particular major
  - “Why did you choose this major?”

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CHEMISTRY MOTIVATION

- Affective interest (4 items, $\alpha = .91$)
  - ‘Chemistry fascinates me.’

- Behavioral interest (3 items, $\alpha = .76$)
  - ‘I like to read about chemistry topics in my spare time.’

- Attainment value (4 items, $\alpha = .83$)
  - ‘The study of chemistry is personally meaningful to me.’

Latent variable measurement models, affective and behavioral interest and attainment value, validated.
ANALYSIS

- Open-ended majors coded and aggregated
- Choice of major reason: Reasons grouped thematically

- Linguistic Inquiry and Word Count text analysis program (LIWC) used to code written text for linguistic features

<table>
<thead>
<tr>
<th>Linguistic Element</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Count</td>
<td></td>
</tr>
<tr>
<td>Affective Processes</td>
<td>happy, cried</td>
</tr>
<tr>
<td>- Positive Emotions</td>
<td>love, new, sweet</td>
</tr>
<tr>
<td>- Negative Emotions</td>
<td>hurt, ugly, nasty</td>
</tr>
</tbody>
</table>

- Regression analysis controlling for gender, race, and SES
- Motivation and content themes (logistic)
- Motivation and linguistic features of explanations (OLS)

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DESCRIPTIVE RESULTS

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DESCRIPTIVIES

Gender Differences by Major

\[ \chi^2 = 38.43, p < .001 \]

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## Why Did You Choose This Major?

### Thematic Coding for Major Choice Explanation (5 Categories)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competence</td>
<td>Competence-driven reasons</td>
<td>&quot;I chose this because I am good at biology.&quot;</td>
</tr>
<tr>
<td>Emotion</td>
<td>Enjoyment/interest</td>
<td>&quot;Because I am interested in biology and microorganisms&quot;</td>
</tr>
<tr>
<td>Helping Others</td>
<td>Altruistic/social impact reasons</td>
<td>&quot;I chose this major because I really want to help others.&quot;</td>
</tr>
<tr>
<td>Profession</td>
<td>Profession-driven reasons</td>
<td>&quot;I chose this major to have a career in the Medical Field.&quot;</td>
</tr>
<tr>
<td>Other/Undecided</td>
<td>Other reasons/Undecided</td>
<td>&quot;Family expectations&quot;, &quot;For set up a strong basic&quot;, &quot;I don't know what I want to do yet.&quot;</td>
</tr>
</tbody>
</table>

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RQ1: THEMES OF MAJOR CHOICE EXPLANATIONS

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RQ1: “WHY” MAJOR CHOICE THEMES BY GENDER AND MAJOR

\[ \chi^2 = 14.14, p < .01 \]

Non-STEM majors omitted due to small sample size (n=4).

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RQ1: “WHY” MAJOR CHOICE THEMES BY GENDER AND MAJOR

\[ \chi^2 = 14.14, \ p < .01 \]

Non-STEM majors omitted due to small sample size (n=4).

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AVERAGE WORD COUNT in “WHY” BY GENDER & MAJOR

Means (word count) reported.

% WORD USE (AFFECTIVE PROCESSES) in “WHY” BY GENDER & MAJOR

Means (proportion of affective words) reported.

% WORD USE (EMOTIONS) in “WHY” BY GENDER & MAJOR

Positive Emotion

\[ F(3, 427) = 10.36^{***} \]

Negative Emotion

\[ F(3, 427) = 0.64 \text{ (ns)} \]

Means (proportion of affective words) reported.

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MAJOR CHOICE THEME ON MOTIVATIONAL BELIEFS
LOGISTIC REGRESSION ANALYSES

Due to sample size limitations, analyses was limited to Emotion and Profession themes. Odds ratios reported. Covariates included.

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LINGUISTIC FEATURES ON MOTIVATIONAL BELIEFS
OLS REGRESSION ANALYSES

**AFFECTIVE INTEREST** ($\beta = 0.13^*$)  
**BEHAVIORAL INTEREST** ($\beta = 0.08$)  
**ATTAINMENT VALUE** ($\beta = 0.11^*$)

**AFFECTIVE INTEREST** ($\beta = 0.02$)  
**BEHAVIORAL INTEREST** ($\beta = -0.05$)  
**ATTAINMENT VALUE** ($\beta = 0.02$)

Standardized beta coefficients reported. Covariates included.

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How language use can be leveraged to understand the science-related motivations and choices is an emerging area of motivation research.

To explore and find your passion (enjoyment) and to prepare for future career (occupation-orientation) are central factors in choosing a major.

A positive link between students’ surveyed motivations and their language use in their explanations.

Reasons for pursuing a major are related to motivation:
- students reported lower levels of interest if major choice was occupation-driven.

Findings for this study offer insights into how we can leverage the power of students’ language use as a tool for further understanding their motivations and cognitions.

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THANK YOU

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The research reported here was supported by a grant from the Institute of Education Sciences (R305A170160). Opinions expressed do not represent the views of the U.S. Department of Education.

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