Language Consideration and Methodological Transparency in "Systematic" Reviews of Animal Toxicity and Communicable Disease Studies

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ICAHIS
9 | JUNE 14-17, 2018
Budapest, Hungary

Outline

- The potential for language-related bias in identifying global literature

- Research project on language consideration in systematic reviews

- Best practices for reducing language-related bias

BIAS IN IDENTIFYING GLOBAL LITERATURE

Identifying language-related bias

Two types of bias

– Not searching places likely to have information

– Excluding information that you found because it is not in a language you read

– Geographic interest in the topic, e.g. regional databases from WHO and others

- African Index Medicus - http://indexmedicus.afro.who.int/
- Index Medicus for the Eastern Mediterranean Region http://www.emro.who.int/information-resources/imemr/imemr.html
- *LILACS* (scientific and technical literature of Latin America and the Caribbean) - http://lilacs.bvsalud.org/en/

– Historic dominance in a discipline

Non-English Literature in PubMed

- PubMed (about 80% English overall)

  - 2015-2016:　　　　　6% non-English (56,329)

  - 1980-1984:　　26% non-English (370,200) ~74K/year

- Impact of limiting to English will be greater in searches for older literature compared to cutting-edge topics.

LANGUAGE CONSIDERATION IN REVIEWS OF ANIMAL TOXICITY AND COMMUNICABLE DISEASE STUDIES

Soon to be under review for publication.

Presented in part as: Alpi KM, Vo T, Dorman DC. Language Inclusion and Search Approaches in "Systematic" Reviews of Animal Toxicity and Communicable Disease Studies. 4th International Symposium on Systematic Review and Meta-Analysis of Laboratory Animal Studies. RTP, NIEHS, August 25, 2017.

INTRODUCTION

Language Inclusion Considerations

- PubMed indexes journals in 40+ languages
- CAB Abstracts indexes publications in 50 languages
- Systematic review (SR) standards incorporate searching for studies in languages other than English (IOM, 2011)
- A 2006 methodological review of SR of animal studies reported that only 27% performed their literature search without language restriction (Mignini & Khan, 2006).
- Translation tools (e.g. Google Translate) have improved since that review.

Mignini LE, Khan KS. Methodological quality of systematic reviews of animal studies. BMC Med Res Methodol. 2006 Mar 13;6:10.

Purpose of the Study

- Assess language consideration in a sample of SR and meta-analyses (MA) since 2006 in animal toxicity and use communicable disease (CD) SR/MA as a comparison group.

- We hypothesized that factors such as funding, international authorship, or adherence to reporting standards might be associated with consideration of non-English language studies.

METHODS

Search Approach

- Searched PubMed from January 1, 2006-May 31, 2017 with no language limits

- Filtered to Systematic Review subset filter OR Meta-Analysis publication type.

- Toxicity in animals (N = 111)

  ("toxicity"[Subheading] AND "animals"[MeSH Terms:noexp]) NOT "humans"[MeSH Terms]

- Communicable disease in animals (N = 69)

  (("Communicable Diseases"[Mesh] OR "Disease Transmission, Infectious"[Mesh] OR "transmission"[Subheading] OR "zoonoses"[MeSH Terms]) AND "animals"[MeSH Terms:noexp]) NOT "humans"[MeSH Terms]

Inclusion Criteria Challenges

- Pilot: Two reviewers (KMA & DCD) independently examined 10% of the reviews to refine the inclusion criteria and data extraction forms.

    - Initial inclusion criteria: Article represents a systematic review with literature search and inclusion/exclusion details.

    - Pilot result: Variable reporting of SR elements necessitated including studies described by their authors as SRs or MAs and which provided search strategy and inclusion criteria.

Data Elements

- Some data were online through PubMed indexing
  - Publication type
  - First/corresponding author address/affiliation
  - Funding source categories (US Govt, Non-US Govt)
- Data extraction performed by TV; checked/edited by KA
  - Databases listed Y/N and names
  - Search terms listed Y/N and terms
  - Language mentioned Y/N and language text
  - Inclusion criteria Y/N and criteria
  - Exclusion criteria Y/N and criteria
  - Study quality/risk of bias Y/N *** and Quality text
  - Review software used Y/N and software names

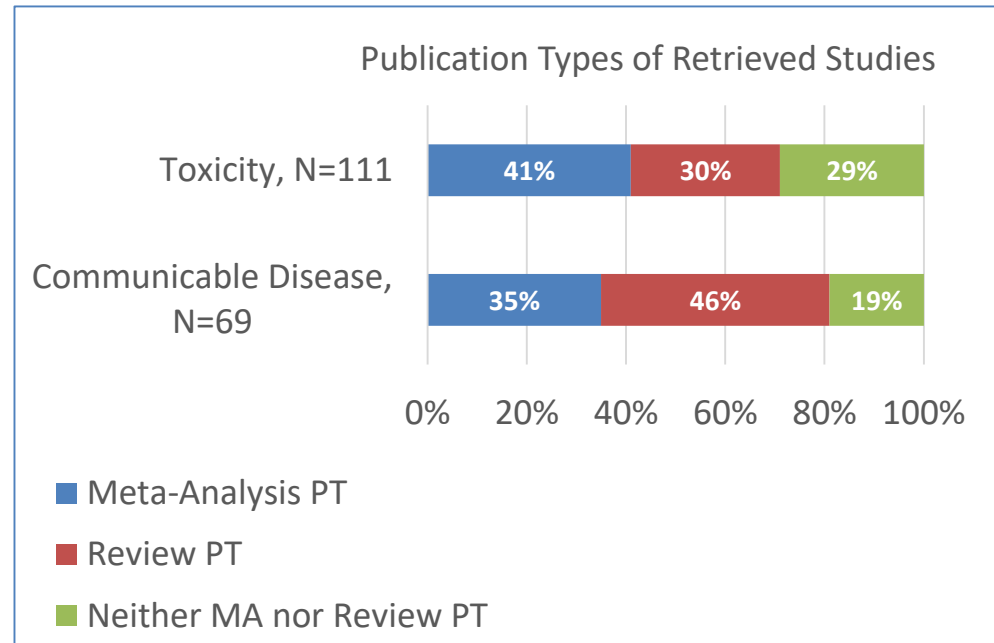 *** Full text independently evaluated by KMA and DCD

Factors Analyzed for Associations

- The prevalence of language consideration was to be analyzed by each of these factors:

  – **Funding**

  – **Non-English country of primary authorship**
    - first author or corresponding author affiliated in country where English is not one of a few official languages (e.g. countries other than USA/UK/Canada/Australia/NZ, etc.)

  – Adherence to SR quality standards, specifically **inclusion of a measure of study quality/risk of bias**

RESULTS

Search Results

Searches retrieved 111 and 69 studies related to animal toxicity and communicable disease, respectively

Publication Types of Retrieved Studies

Toxicity, N=111 — 41% | 30% | 29%

Communicable Disease, N=69 — 35% | 46% | 19%

- Meta-Analysis PT
- Review PT
- Neither MA nor Review PT

- Two independent reviewers evaluated each study for inclusion with discrepancies resolved by consensus.
  - 35 of 111 (32%) Toxicity reviews
  - 32 of 69 (46%) CD reviews
- Low inclusion rates reflect the loose nature of the Systematic Review subset word searching in PubMed

# Language Consideration in SRs
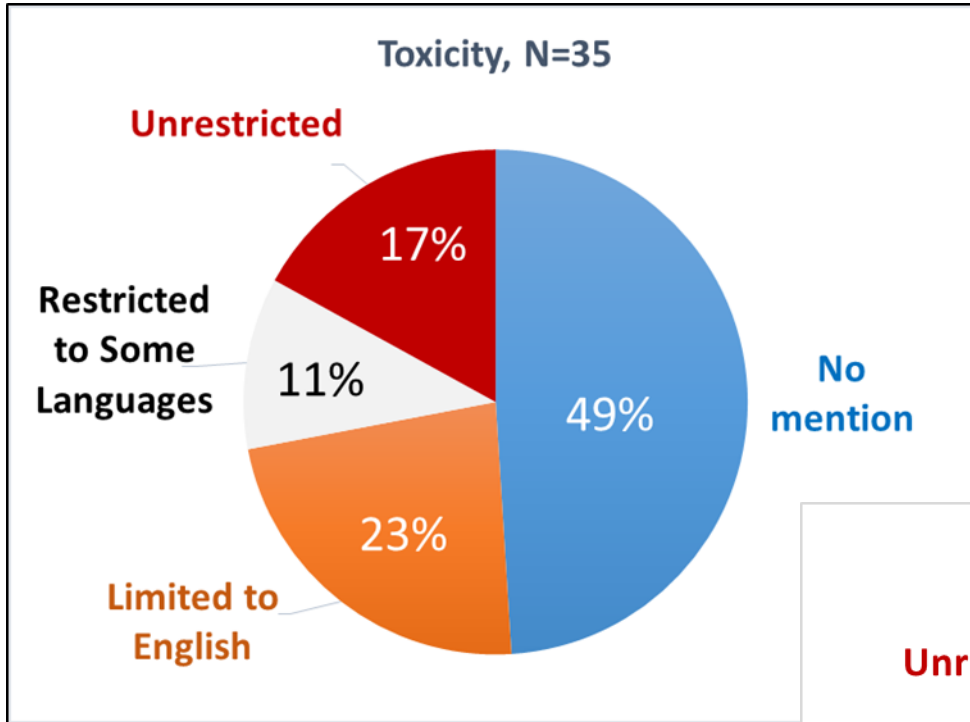
Toxicity, N=35

Toxicity: languages restricted to one or more of the following:
Chinese, Portuguese, Spanish, French, or Italian

40% unrestricted/some and 35% not mentioning language cited non-English references.

CD: languages restricted to one or more of the following:
French, Spanish, Portuguese, German; all except Japanese and Chinese publications

45% unrestricted/some and 50% not mentioning language cited non-English references [Russian, French, German]

Communicable Disease, N=32
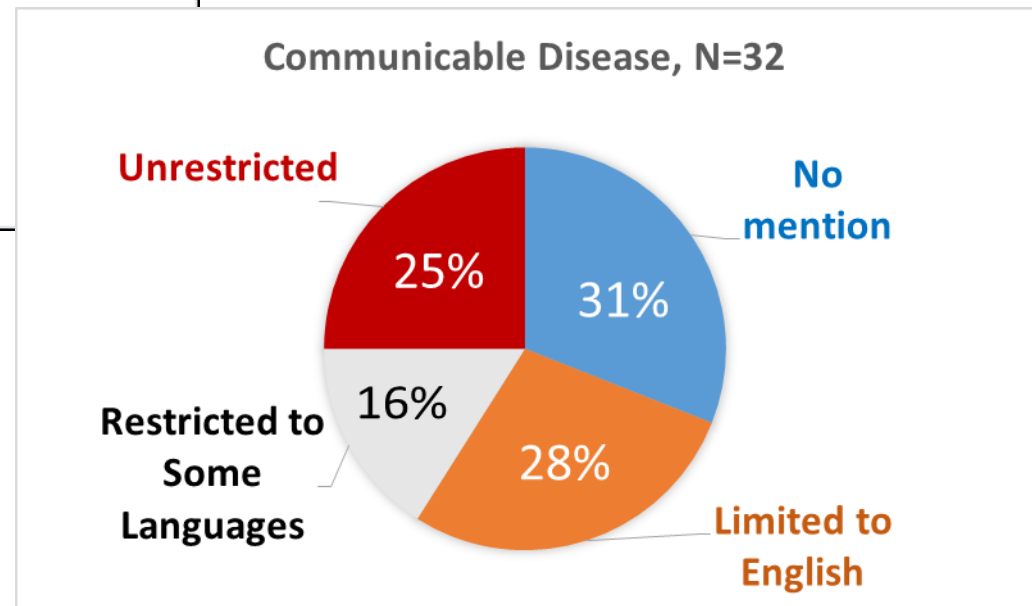
Databases Commonly Searched

Database Name	Toxicology (N = 35)	Communicable Dis. (n = 29)
PubMed / MEDLINE	19	20
Web of Science alone or as part of Web of Knowledge	21	17
Google Scholar	7	8
Median; Mean ± SD; Max	2; 2.9 ± 2.5; 11	3; 4.5 ± 5.2; 27
CAB Abstracts / CAB Direct	*2*	*10*
Agricola	*2*	*4*
LILACS	*0*	*4*
Scopus	*2*	*4*
Science Direct	*5*	*2*
EMBASE	*2*	*3*

The mode for both disciplines was **1**; a single database was used by 19% (n = 6) of the communicable disease studies and 37% (n = 13) of the toxicity studies.

Quality Reporting

	Toxicity, N = 35	Communicable Disease, N = 32
Study Quality / Risk of Bias Analysis Reported	20% (n = 7)	31% (n = 10)
Agreement on presence of quality analysis reporting	91%	94%
Publication Bias Analysis Reported	29% (n = 10)	16% (n = 5)
Agreement on presence of publication bias analysis reporting	100%	100%

- Fewer than 1/3 of studies reported either quality indicator. There were no consistent patterns or statistically significant differences in prevalence of quality reporting or publication bias analysis in either discipline.

- Publication bias analysis is slightly more consistently identified by evaluators when present than study quality/risk of bias reporting (Z = 2.3, p = 0.02).

Country of First Authorship

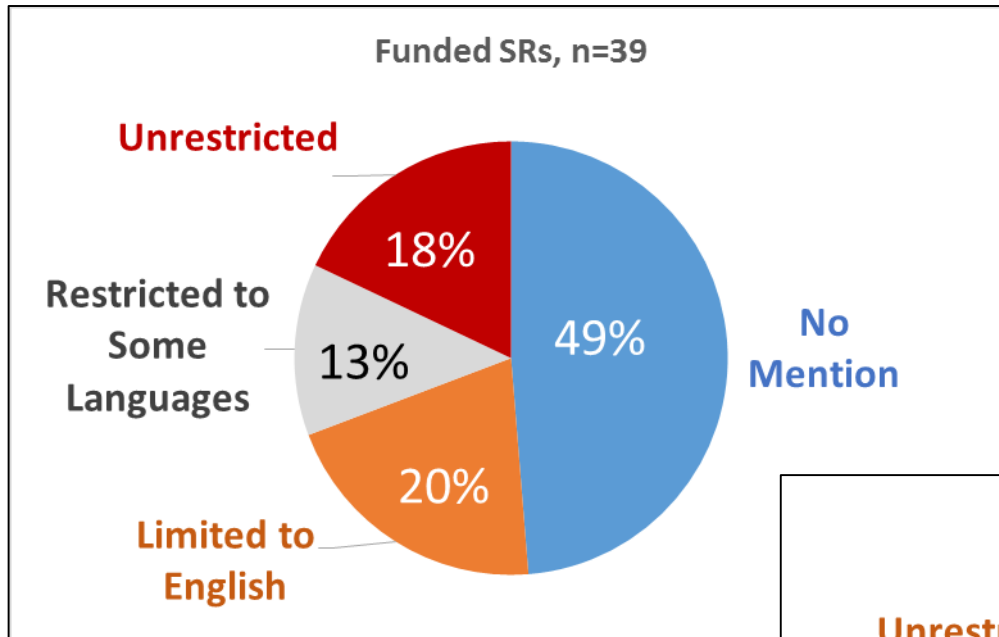55% of first authors from countries where English is a primary official language

- Toxicity

    16 / 35 (46%)
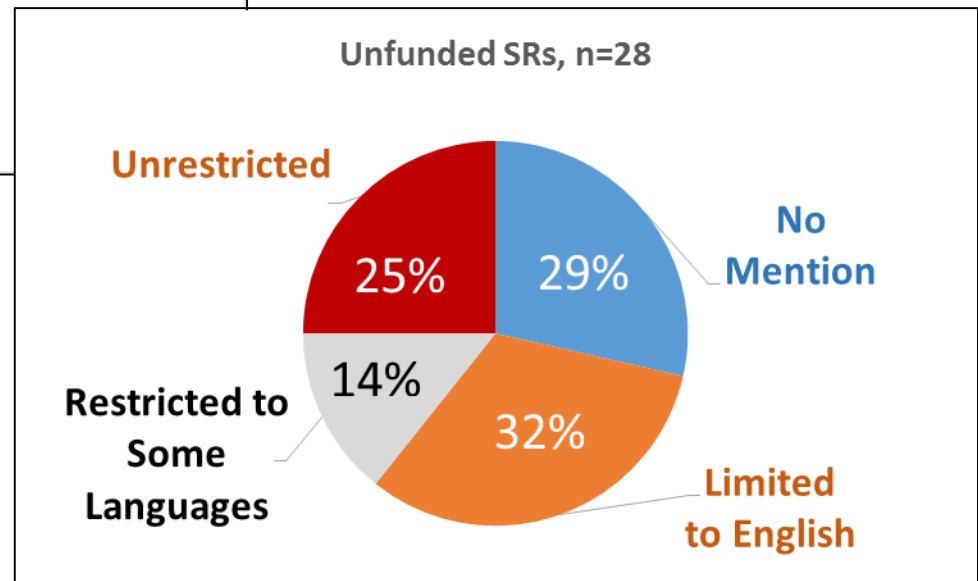
- Communicable Diseases

    21 / 32 (66%)

pixabay.com/en/globe-world-map-earth-32299/

There was no statistically significant difference in language consideration by Country of First Authorship.

Language Consideration by Funding

Funded SRs, n=39

Unrestricted
18%
Restricted to Some Languages 13%
No Mention 49%
Limited to English 20%

Rate of funded SR by discipline was similar (CD: 56% ; Tox 63%) so pooled for comparison.

Unfunded SRs, n=28

Unrestricted 25%
No Mention 29%
Restricted to Some Languages 14%
Limited to English 32%

Funding was not statistically associated with an increased consideration of non-English literature.

NC STATE UNIVERSITY

Language Consideration by Quality

Toxicity

- 3 of 25 (12%) of language not mentioned/English-only report quality/ROB.

- 4 of 10 (40%) of unrestricted/some languages report quality/ROB

- Not significant, $Z = 1.9$, $p = 0.06$

Communicable Disease

- 2 of 19 (10%) of language not mentioned/English-only report quality/ROB.

- 8 of 13 (62%) of unrestricted/some languages report quality/ROB

- $Z = 3.1$, $p = 0.0022$

Combining SRs, the pooled rates of 11% compared with 52% is statistically significant ($Z = 3.6$, $p = 0.003$). We assume that both language and quality consideration relate to following SR guidelines and we will test this assumption.

DISCUSSION

Conclusions

- 40% of these SRs are silent on consideration of non-English or non-native language literature.

- Variability in considering non-English literature was not explained by funding source or whether the first author came from an English-speaking country.

- Quality reporting appears to be more common in studies that also report language consideration; we will examine the association between these SR and MA reporting guideline elements.

Recommendations for Investigators

Languages ▼

☐ ENGLISH (249)
☐ CHINESE (3)
☐ GERMAN (2)
☐ UKRAINIAN (1)
☐ POLISH (1)

more options / values...

- **Scoping:** extent of studies in other languages can guide collaboration or budgeting

  – Some databases (e.g. Web of Science provide breakdowns by language.

- **Budgeting:** Translation costs can be estimated by looking at the proportion of other language articles.

  - Costs vary by language.

  - Free translation software has been studied for screening articles and reducing translations needed to yield data relevant to the SR or MA

    - Balk et al. Data extraction from machine-translated versus original language randomized trial reports, *Systematic Reviews*, 2013.

Additional Recommendations

- Partnering: Including local or remote collaborators with language skills is another approach to inclusivity.

Librarians can assist with scoping, budgeting, and partnering by identifying collaborators with language skills.
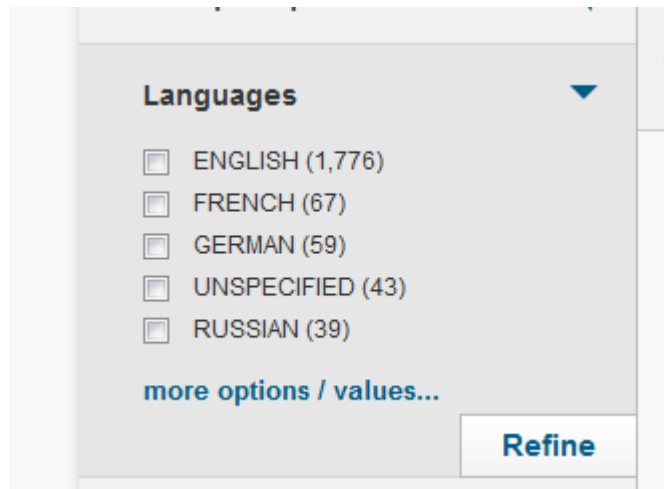
- Reporting quality depends on investigators, reviewers, and editors. Ask authors to be explicit about work available in other languages even if they did not include it.

Best practices for reducing exclusion-related language bias - 1

– Scoping, know how much literature is in other languages

  • Examples using Web of Science

– Do you really need a complete verified translation to rule something out?

– Do you need the whole paper translated expertly to rule something in or get the information you need?

– From English abstracts to Translations

  • Steps for machine translation

  • Collaborative partnerships

Non-English Literature in Web of Science

- Web of Science (% not reported)
  - Access to regional citation indexes for Korea, Latin America, and Russia is part of Web of Science Core Collection subscription, but you have to search All Databases.
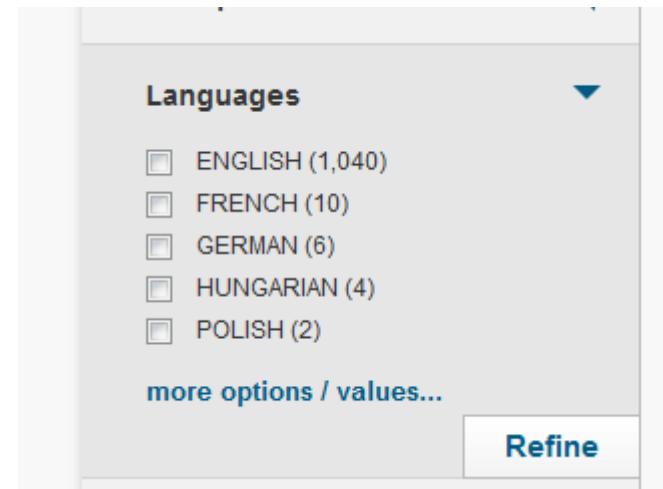

Languages

- ENGLISH (1,776)
- FRENCH (67)
- GERMAN (59)
- UNSPECIFIED (43)
- RUSSIAN (39)

more options / values...

Refine

See the difference in numbers for camel milk from All Databases (left) to just WOS (right)

Languages

- ENGLISH (1,040)
- FRENCH (10)
- GERMAN (6)
- HUNGARIAN (4)
- POLISH (2)

more options / values...

Refine

Best practices for reducing exclusion-related language bias - 2

– Scoping, how much literature is in other languages
  • Class examples using Web of Science

– Do you really need a complete verified translation to rule something out?

– Do you need the whole paper translated expertly to rule something in or get the information you need?

– From English abstracts to Translations

  • Steps for machine translation, e.g. Google Translate

  • Collaborative partnerships

Sources of language expertise

- Multilingual communicators/interpreters list for the Veterinary Hospital
- Veterinary faculty who have studied/done research overseas
- College of Humanities and Social Sciences - Translators
- Language or cultural clubs, e.g. Office of International Services Culture Corps
- Your collaborator's institution
  - For example, NIH investigators have free Translation Services from Spanish and Russian. nihlibrary.nih.gov/services/translations

Care and Caveats
  - Talking is not the same as reading for some
  - Not right now doesn't mean never in terms of future collaborations

Questions?
Please Share Your Experiences.

- Contact me at kristine_alpi@ncsu.edu