From the 'best of our knowledge' to the 'best available knowledge'

Adam Craig and Carl Taswell

Brain Health Alliance, Ladera Ranch, CA, USA

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Dismissive and ghosting literature reviews

Dismissive literature review from Phelps, R. P. (2012). Dismissive reviews: Academe's memory hole. *Academic Questions*, 25(1).

1. Have an idea for a project or paper.
2. Do the project or write the paper the way you want.
3. Avoid searching for similar prior work.
4. Argue from ignorance that your work is novel.

Ghosting literature review defined here:

1. Read some of the literature.
2. Paraphrase and plagiarize the concepts and ideas found.
3. Act as if the original works and authors do not exist.
4. Refrain from citing, referencing and discussing the historical record of the published literature.

Kinds of wrong information

		Authors know information is false?	
		No	Yes
Authors willing to correct the information?	Yes	Misinformation	Disinformation
	No	Anti-information	Caco-information

- A dismissive literature review is misinformation.
- Refusal to correct can escalate it to anti-information (anti-review).
- A ghosting literature review is disinformation.
- Refusal to correct can escalate it to caco-information (caco-review).
- See Taswell, S. K., Athreya, A., Akella, M., & Taswell, C. (2021). Truth in science. *Brainiacs Journal*, Volume 2 Issue 1

The cost of ghosting literature reviews

- As remarked in (Phelps, 2012), a dismissive literature review can erase an entire branch of research.
  - The study containing the dismissive review becomes prominent.
  - People stop looking for older work when they find it.
- Willful feigned ignorance is worse than careless ignorance.
  - Using ideas from the intentionally ghosted literature is idea-laundering plagiarism.
  - Purposeful deniers likely to keep denying, even when others try to correct them.
- What if the ghosting reviewer actually did some work?
  - They may have replicated important experiments.
  - Comparing the replication and original requires knowing about both.

How do we counter ghosting literature reviews?

- Make the original works easier to find.
- Create web infrastructure for managing metadata.
- Make it easier to identify works that address the same ideas.
- Create tools for identifying equal and equivalent entities.
- Social engineering with both incentives for doing right and disincentives for doing wrong.
- Professional codes of conduct must have accountability with enforcement mechanisms — otherwise they are simply meaningless and intended for show only but not substance.

The start of the PORTAL-DOORS Project

- The first PORTAL-DOORS Project paper featured the core concept of helping stakeholders find relevant prior work and other resources with semantic web technologies.
  - Introduced the ManRay web-enabled ontology of nuclear medicine
  - Taswell, C., Franc, B., & Hawkins, R. (2006). The ManRay project: Initial development of a web-enabled ontology for nuclear medicine. Journal of Nuclear Medicine May 2006, 47 (suppl 1) 371P
- The foundational design paper described the core goals, design principles, and architecture.
  - Bridge the silos of scholarly disciplines.
  - Host human-readable lexical information.
    - In a Problem-Oriented Registry of Tags And Labels (PORTAL)
  - Connect it to machine-readable semantic web content.
    - In a Domain Ontology-Oriented Resource System (DOORS) directory
  - Taswell, C. (2007). DOORS to the semantic web and grid with a PORTAL for biomedical computing. *IEEE Transactions on Information Technology in Biomedicine*, 12(2), 191-204.

Organization of the current NPDS Cyberinfrastructure

- The system first described in the 2007 paper has developed into the Nexus-PORTAL-DOORS-Scribe (NPDS) Cyberinfrastructure.
- **Atlas** servers only host Atlas services.
  - Atlas maps serve URI and IRI identifiers (entity labels).
- **PORTAL** servers host PORTAL & Atlas services.
  - Portal registries serve entity labels & lexical metadata.
- **DOORS** servers host DOORS & Atlas services.
  - DOORS directories serve entity labels, semantic descriptions, & locations.
- **Nexus** servers host Nexus, PORTAL, DOORS, & Atlas services.
  - Nexus diristries serve all of the above kinds of information.
  - Taswell, C. (2010). A distributed infrastructure for metadata about metadata: The HDMM architectural style and PORTAL-DOORS system. *Future Internet*
- **Scribe** servers host Scribe plus all of the above kinds of services.
  - Scribe registrars provide read-write access to all of the infosets above.
  - Craig, A., Bae, S. H., Veeramacheneni, T., Taswell, K., & Taswell, C. (2016). Web Service APIs for Scribe Registrars, Nexus Diristries, PORTAL Registries and DOORS Directories in the NPD System. In *Proceedings of SWAT4LS 2016*.

Availability of the NPDS cyberinfrastructure

- BHA provides live instances of example Scribe servers and curation web apps:
  - https://www.portaldoors.net
  - https://www.brainhealthalliance.net
  - https://www.telegenetics.net
- The example implementation of the NPDS software is open-source, freely available, and will be updated with Microsoft's NET 10 platform release.
  - https://github.com/BHAVIUS/PORTALDOORS
- The defining features of the NPDS Cyberinfrastructure are the messaging protocol and REST API.
  - This allows implementations built on completely different technology stacks to communicate.
  - Schemas available at https://github.com/BHAVIUS/PDP-DREAM/tree/ctbhavius/PDP.DREAM.NpdsDataLib/Schemas
  - See Craig, A., Bae, S. H., & Taswell, C. (2017). Message Exchange between Independent Implementations of Servers in the Nexus-PORTAL-DOORS System. *Proceedings of SWAT4HCLS 2017*.

PDP-DREAM Ontology

- To aid creation of semantic markup, BHA has developed several formal ontologies, including...

ManRay	nuclear medicine
CTGaming	clinical telegaming
SOLOMON	progressive neurodegenerative diseases

- **PDP-DREAM Ontology** combines multiple modules that cover...
  - The Discoverable Data with Reproducible Results for Equivalent Entities with Accessible Attributes and Manageable Metadata (DREAM) Principles, which guide the work of the PDP.
  - The structure and function of NPDS records.
  - Contributor roles, compatible with the Contributor Role Taxonomy
  - Fair Attribution to Indexed Reports (FAIR) Metrics of citational justice.
- All available in https://github.com/BHAVIUS/PDP-DREAM/tree/ctbhavius/PDP.DREAM.NpdsDataLib/Schemas

The Fair Attribution to Indexed Reports (FAIR) Metrics

- To rate how well works cite their sources for concepts and ideas, we need well-defined quantitative metrics.
- The goal: Measure how well a scholarly work makes it possible to trace concepts and ideas back to their original sources.
- These concepts and ideas are the same when equivalent in substantive meaning, ie, when mapped to each other by vocabulary and ontology maps regardless of wording, paraphrasing or translation from one language to another.
- The process of calculating the metrics must itself be reproducible, recorded in a systematic, preferably machine-readable format.
- Source: Craig, A., Ambati, A., Dutta, S., Kowshik, P., Nori, S., Taswell, S. K., ... & Taswell, C. (2019, June). DREAM Principles and FAIR Metrics from the PORTAL-DOORS Project for the Semantic Web. In 2019 *11th International Conference on Electronics, Computers and Artificial Intelligence (ECAI)* (pp. 1-10). IEEE.

The 4 FAIR Metrics for primary research articles

- We first introduced FAIR Metrics to measure the appropriateness of citations in scholarly works.
- We first categorize and count the substantive claims, using 4 counts:
  - A (correctly attributed), M (misattributed)
  - N (genuinely novel), P (plagiarized)
- We next compute ratio FAIR Metrics emphasizing different counts:
  - $F_A = \frac{A}{A+M+P}$ general appropriateness of attribution
  - $F_M = \frac{A-M}{A+M+P}$ misattribution focused
  - $F_N = \frac{A-N}{A+M+N+P}$ balance of novel to attributed (non-normative)
  - $F_P = \frac{A-P}{A+M+P}$ plagiarism focused
- Source: Craig, A., Athreya, A., & Taswell, C. (2023, October). Example evaluations of plagiarism cases using FAIR Metrics and the PDP-DREAM Ontology. In *2023 IEEE 19th International Conference on e-Science (e-Science)* (pp. 1-2). IEEE.
- Example evaluation of an article: https://npds.portaldoors.net/nexus/fidentinus/wilkinson2016fgpsdms

The 4 FAIR Metrics for peer reviews

- Should not introduce new research claims or ideas. $\rightarrow$ Remove N and P.
- Should cite sources for claims. $\rightarrow$ Keep A and M.
- Distinguish whether claims are about...
  - The **target** work under review (A_T, M_T)
  - The **venue** of publication, typically conference or journal (A_V, M_V)
  - The problem **domain** of the target work (A_D, M_D)
- We then use these six counts to define four ratio FAIR Metrics:
  - $f_T = (A_T - M_T)/(A_T + M_T)$
  - $f_V = (A_V - M_V)/(A_V + M_V)$
  - $f_D = (A_D - M_D)/(A_D + M_D$
  - $f_J = (A_T + A_V + A_D - M_T - M_V - M_D)/(A_T + A_V + A_D + M_T + M_V + M_D)$
- Source: Craig, A., & Taswell, C. (2024, September). FAIR Metrics for Motivating Excellence in Peer Review. In *2024 IEEE 20th International Conference on e-Science (e-Science)* (pp. 1-2). IEEE.
- Example evaluation of a peer review: https://npds.portaldoors.net/nexus/fidentinus/submission1review1

Recording FAIR Metrics analysis of peer review using the PDP-DREAM Ontology

- We previously designed a FAIR Metrics module of the PDP-DREAM Ontology with classes (e.g., "Document" and "Claim") and properties (e.g., "hasAttributionTo") to enable recording of a FAIR Metrics analysis in a resource description framework (RDF) document.
- We have now expanded it to include additional classes and properties useful for recording FAIR Metrics analyses of peer reviews.
- RDF record for synthetic example review: http://npds.portaldoors.net/nexus/fidentinus/Submission1Review1
- Also accessible via the NPDS curation app: https://www.portaldoors.net/NPDS/NexusService/AnonResreps/Diristry/Fidentinus/AnyAndAll/Nexus
- Soruce: Craig, A., & Taswell, C. (2024, September). FAIR Metrics for Motivating Excellence in Peer Review. In *2024 IEEE 20th International Conference on e-Science (e-Science)* (pp. 1-2). IEEE.

Reproducible peer review

- When a journal fully implements open peer review, we know who reviewed an article and what they said.
- We still do not know on what basis they said it.
- At *Brainiacs Journal*, our goal is not just open but reproducible peer review.
- The standard: Can a second reviewer follow the reasoning and evidence the first reviewer used to arrive at their conclusion?
- Source: Craig, A., Lee, C., Bala, N., & Taswell, C. (2022). Motivating and maintaining ethics, equity, effectiveness, efficiency, and expertise in peer review. *Brainiacs Journal* 3 (1):I5B147D9D

Social influence and ethical behavior

- What we see others do influences how we perceive the ethics of our own behavior.
- A recent meta-analysis: The ability of social interaction to support change (in diet, exercise, etc.) was small but persistent and reproducible.
- A social variant of the marshmallow experiment: Promising a peer increased the children's success at waiting to eat.
- A study of online communities: Peer norms can discourage members from seeking outside connections or life goals.
- The Milgram experiments: An authority figure can sway people to act in ways they would normally find inappropriate.

The influence of social media

- Social media can amplify the reach of calls to action.
- The nature of the appeal impacts the result in complex ways.
- A recent study on online petitions:
  - Appealing to moral outrage
    - Higher virality
    - Not higher number of signatures
  - Appealing to other factors (agency, group identitiy, prosociality)
    - Not higher virality
    - Higher number of signatures
- Arguments from large language models can sway human opinion.
  - Having information about the target human increased the success rate.

Socially aware knowledge engineering

- The problems:
  - Machine-generated propaganda optimized to elicit strong emotions
  - Signal boosting by bots on social media
  - Spam drowning out productive, community-building human-human interactions
- Our proposed solution:
  - Building decentralized online communities.
  - Empowering individuals and small organizations to set up their own services to share their own data.
  - Including both human-readable lexical metadata and machine-readable semantic markup.
  - Using explainable semantic reasoning engines to find the most relevant answers.

The need for metatextual context in metadata

- The existing FAIR Metrics focus on the content of scholarly works.
- Judging the trustworthiness of literature requires metatextual knowledge of the societal context.
- Distinguishing misinformation v. disinformation: Did the authors know that the information was false?
- Distinguishing (misinformation v. anti-information) or (disinformation v. caco-information): Did the authors correct the information when given the opportunity?
- Dismissive v. ghosting literature reviews: Did the authors know that relevant prior work existed?
- Idea-laundering plagiarism: obfuscating plagiarism, denying the plagiarism, and refusing to cite the original work
  - Did the plagiarists previously interact with the authors of the original?

Ontologies for social context

- Other ontology engineering efforts have incorporated potentially useful social information into semantic knowledge graphs.
- Some specifically for the purpose of providing social context to scholarly outputs.
- The widely used Friend-of-a-Friend (FOAF) Ontology: various kinds of social interactions and relationships
- FOAF-Academic: a specialized version for tracking collaborators in academia
- AcademIS Ontology: a purpose-built ontology for tracking collaborations among researchers
- Dublin Core: controlled vocabulary for publishing bibliographic metadata

Incorporating social context into NPDS records

- NPDS cyberinfrastructure supports use of any desired ontology in semantic descriptions.
- The next step will be developing a new family of FAIR Metrics that accounts for prior social connections.
- Example: A new count, P_C: plagiarism of known colleagues
- Definition: claims plagiarized from works presented at conferences the authors of the evaluated work attended or from works by past collaborators
- Original plagiarism-focused FAIR Metric: $f_P = (A - P)/(A + M + P)$
  - A: count of correctly attributed claims
  - M: count of misattributed claims
  - P: count of plagiarized claims
- New, context-augmented, plagiarism-focused FAIR Metric: $f_C = (A - P - P_C)/(A + M + P)$.
- Testing will require gathering of social network information.

Key points

- The rise of the World Wide Web increased access to information.
- Also increased need to find the source of information.
- NPDS Cyberinfrastructure supports metadata management, including tracking of sources.
- The rise of social media/Web 2.0 brought increased centralization.
- NPDS empowers individuals and small organizations to host and customize their own metadata and data.
- The rise of large language models creates new information chokepoints that further obfuscate provenance.
- NPDS supports management of semantic knowledge graphs for interpretable, correctable semantic reasoning engines.
- The rapid pace of social and technological change creates a rapidly shifting landscape of relationships.
- The next step for NPDS development will be strategies to better account for social context.

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Contact Info

- acraig@bhavi.us
- www.BHAVI.us
- www.BrainHealthAlliance.org