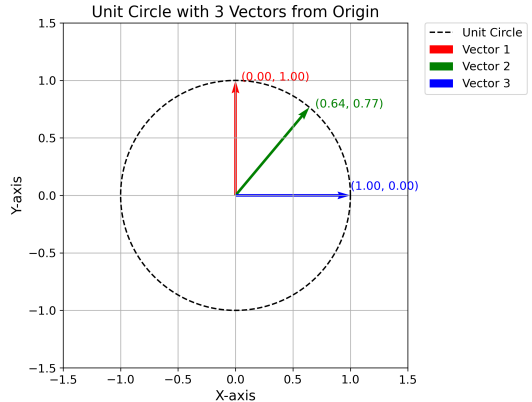# Decoding Sustainability Communication via NLP

NILS.HOLMBERG@IKO.LU.SE

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Introduction

- Sustainability websites = transparency + persuasion

- Signal legitimacy and engage stakeholders

- Shell = technical; WWF = emotional

- Manual coding lacks scale/nuance

- **Aim:** Use NLP to compare Shell vs WWF

(Insert diagram: corp vs NGO)

Stakeholder Theory Expectations

- Message shaped by stakeholders

- Shell: investors/regulators = "investment", etc.

- WWF: donors/public = "donor", "nature"

- Shell: data-driven; WWF: community focus

- Predictable via lexical/semantic analysis

(Insert graphic: stakeholder mapping)

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Framing Theory Expectations

(Insert diagram: framing strategies)

- Framing guides perception

- Shell: optimistic "innovation" frame

- WWF: moral/problem frame ("action", "duty")

- Shell: business advantage; WWF: urgency

- Detectable via framing terms

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Data & Methodology

(Insert NLP pipeline sketch)

- 7 webpages each from Shell and WWF

- Cleaned HTML, kept main content

- SpaCy tokenization, lemmatization

- Lexical: count theory-based keywords

- Semantic: BERT embeddings + similarity

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Lexical Analysis Results

(Insert frequency bar chart)

- Shell: "energy", "emission", "investment"

- WWF: "conservation", "donor", "nature"

- Terms rarely overlap between orgs

- Shell = tech & opportunity; WWF = duty & action

- Clear lexical patterns match theory

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Semantic Similarity (BERT)

(Insert similarity heatmap)

- Shell aligns with "investment", etc.

- WWF aligns with "donor", "action"

- Shell avg. stakeholder similarity = 0.26

- WWF avg. framing similarity = 0.25

- Semantic match confirms lexical trends

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Theoretical Implications

(Insert concept map: theory + findings)

- Shell confirms stakeholder focus

- WWF shows moral advocacy focus

- Shell = opportunity frame; WWF = moral frame

- NLP helps refine both theories

- Empirical grounding boosts explanatory power

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Communication Implications

(Insert icons: tech vs moral appeals)

- Shell = competence; WWF = emotional appeal

- Tailored messaging for each audience

- NLP = replicable insight, not anecdotal

- Firms = clarify tech; NGOs = build urgency

- Messaging must match mission + audience

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Scalable Analysis

(Insert cloud or NLP infrastructure diagram)

- Method scales to 100s of sites

- Cloud + BERT = efficient workflows

- Topic models could reveal trends

- Text + image data can be fused

- Big data boosts theory + practice

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Conclusion & Future Directions

(Insert multimodal analysis diagram)

- NLP reveals Shell vs WWF messaging logics

- Confirms stakeholder + framing theory

- Lexical + semantic = stronger analysis

- Actionable insights for communication design

- Future: multimodal + large-scale studies

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