The History of Business Strategy: An NLP Perspective

A natural-language-processing
exploration of the thematic landscape
of the field of Business Strategy,
1980-2020

General Assembly DSI-10 Showcase

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"Uncertainty is a key source of competitive advantage."

Statement of business problem.

- **Essential problem**. Detect major *themes* in published business-strategy literature.

- **Target Audience**.
  - Business consultants.
  - Academic researchers.

- **Potential benefits**.
  - Ability to provide more-insightful guidance to clients.
  - Better understanding of the body of research.
 - Opportunities to apply methods to other problems.

Key Business Problem: Five key *themes* dominated the business-strategy research over the last century. *Can we detect them using machine-learning methods?*

Theme	Period of Prevalance	Noteworthy Publications (known-theme documents)
Operations Research and Management Science	Late 1800s to 1980s	[Wikipedia] Scientific Management.
Competitive Advantage	1980s to early 2000s	[Porter1979] M. Porter, "Five forces...", *Harvard Business Review*, March 1979. [Porter1996] M. Porter, "What is strategy?" *Harvard Business Review*, Nov 1996.
Disruptive Innovation	Late 1990s to present	[Christensen2015] C. Christensen, "What is disruptive innovation?" *Harvard Business Review*, Dec 2015.
Dynamic Capabilities	Early 2000s to present	[Teece1997] D. Teece, "Dynamic capabilities and strategic management," *Strategic Management Journal*, Aug 1997.
Information as Strategic Asset	Emerging	[Drucker1993] P. Drucker, *Post-Capitalist Society*, Harper-Collins, 1993. [Reeves2018] M. Reeves, "Competing on the rate of learning", BCG Henderson Institute, Jul 2018. [Hamlett2019] N. Hamlett, "Competitive advantage based on information", working paper, April 2019.

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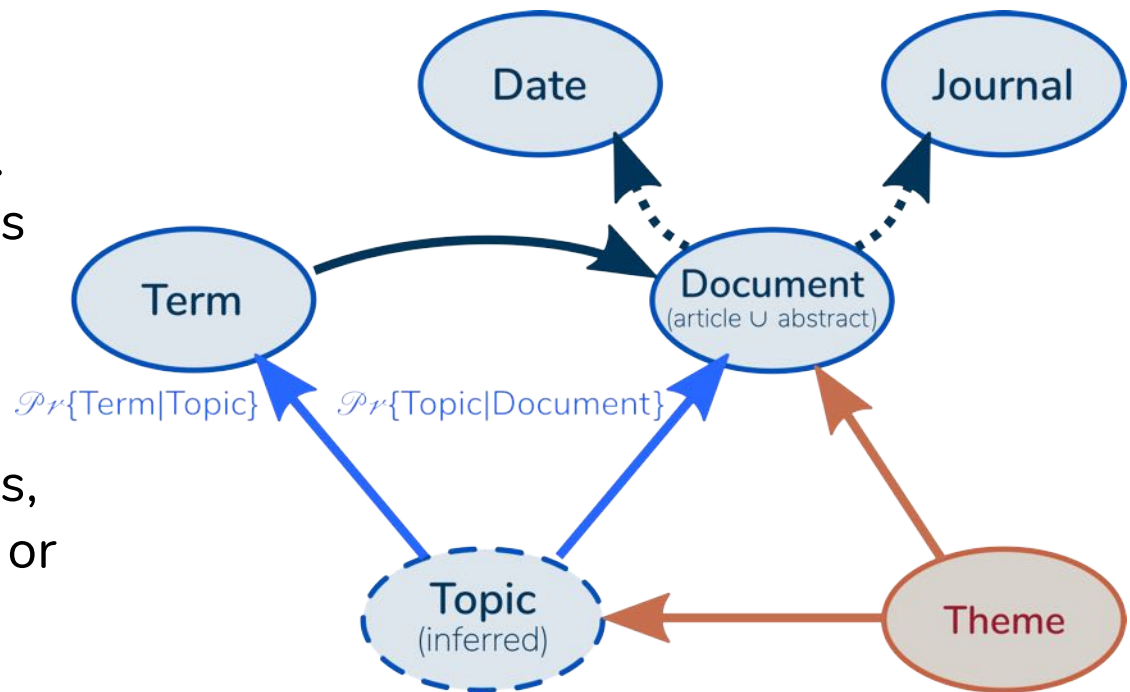
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What makes this problem challenging?

- Fuzzy definitions of "strategy".
  - Probably lots of the content that's not completely on-point with major themes.

- Significantly more recent content than earlier content.

- Lots of editorial variation across journals.

- Less than full-text: Working only with titles, abstracts (this phase only).

- This type of problem is hard in general.

- Personal learning curve for Spark-Scala.

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Tools: A mixture of technologies and methods was employed to produce the results.

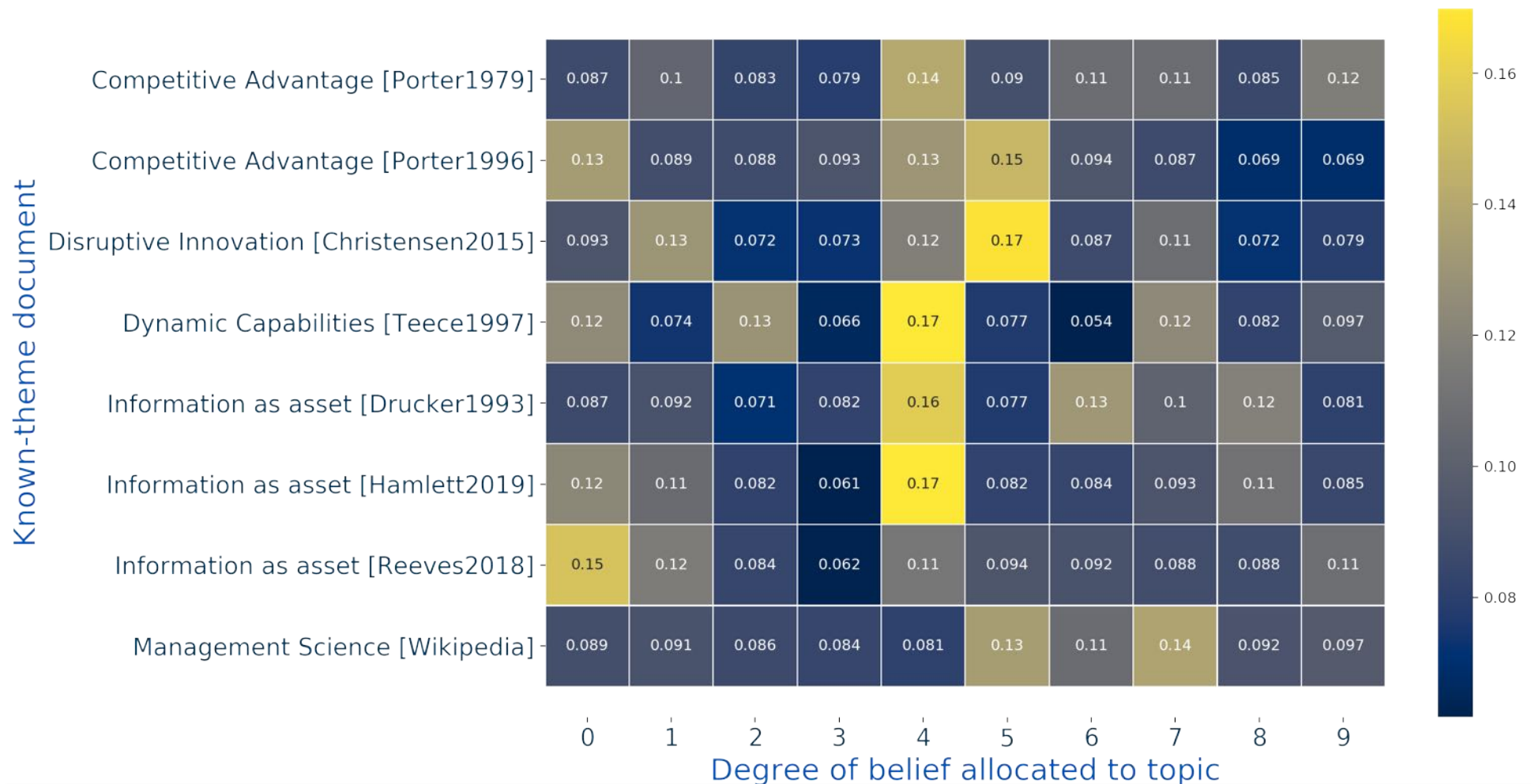*"Uncertainty is a key source of competitive advantage."*
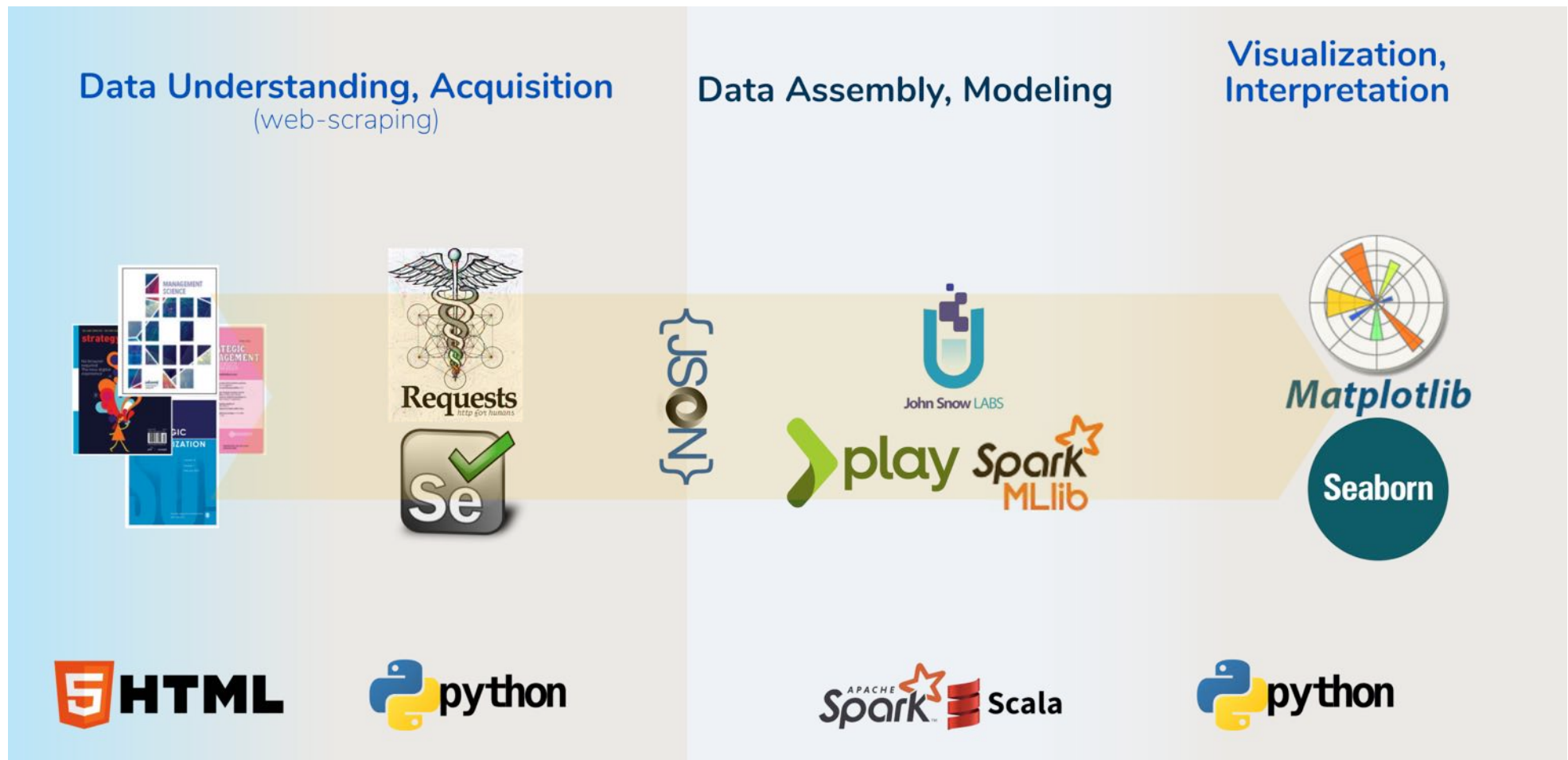
Modeling Approach: Latent Dirichlet Allocation (LDA) — a Bayesian unsupervised-learning method — is commonly used for topic analysis.

▷ **Latent**: The *Topic* attribute is "latent": Not directly observable.

▷ **Dirichlet**: The *Topic* probabilities are described by Dirichlet probability distributions.

▷ **Allocation**: We allocate our degrees of belief across all topics, not definitively assigning to one or another.

$\mathscr{P}r\{\text{Term}|\text{Topic}\}$ $\mathscr{P}r\{\text{Topic}|\text{Document}\}$

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Key result: The model allocates degrees of belief $\mathscr{Pr}$\{Topic | Document\} for each document across all topics.

Known-theme document

Degree of belief allocated to topic

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Conclusion: Strong associations exist between known-theme documents and topics, but we fail to distinguish between themes.

Theme	Known-Theme Documents	LDA-Algorithm Associations of Known-Theme Documents to Topics.
Operations Research and Management Science	[Wikipedia]	▻ Significant association with two distinct topics. ▻ Some overlap with competitive advantage. ▹ *Unsurprising* since both grounded in microeconomic concepts.
Competitive Advantage	[Porter1979] [Porter 1996]	▻ Significant association with three topics. ▹ *Unsrurpising* given that framework spans at least four distinct concepts.
Disruptive Innovation	[Christensen2015]	▻ Significant association with two topics. ▻ Shared association with one competitive-advantage topic. ▹ *Unsurprising* given close assocation between respective
Dynamic Capabilities	[Teece1997]	▻ Significant association with two topics. ▻ Shared association with one competitive-advantage topic. ▹ *Somewhat surprising* given emphasis with which some adherents distance themselves from Porter framework.
Information as Strategic Asset	[Drucker1993] [Reeves2018] [Hamlett2019]	▻ Significant association with two topics. ▻ Close alignment of [Drucker1993], [Hamlett2019] to dynamic capabilities. ▻ [Reeves2018] less thematically-aligned than expected.

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Further directions: INFORMS Annual Meeting 2020.

(http://meetings2.informs.org/wordpress/nationalharbor2020/)

- Harvest full-text articles.
  - Fewer journals, more text.
  - Possibly one previously-unused business magazine.

- Increase the signal strength.
  - Move beyond stemming to lemmatization, part-of-speech tagging.

- Explore improved algorithm scoring.
  - Look for a way to get "cleaner" topics.

- Attempt to visualize the evolution over time.

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Questions?

"About your cat, Mr. Schrödinger—I have good news and bad news."

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Theme ① : The *Competitive-Advantage* framework spans multiple topics.
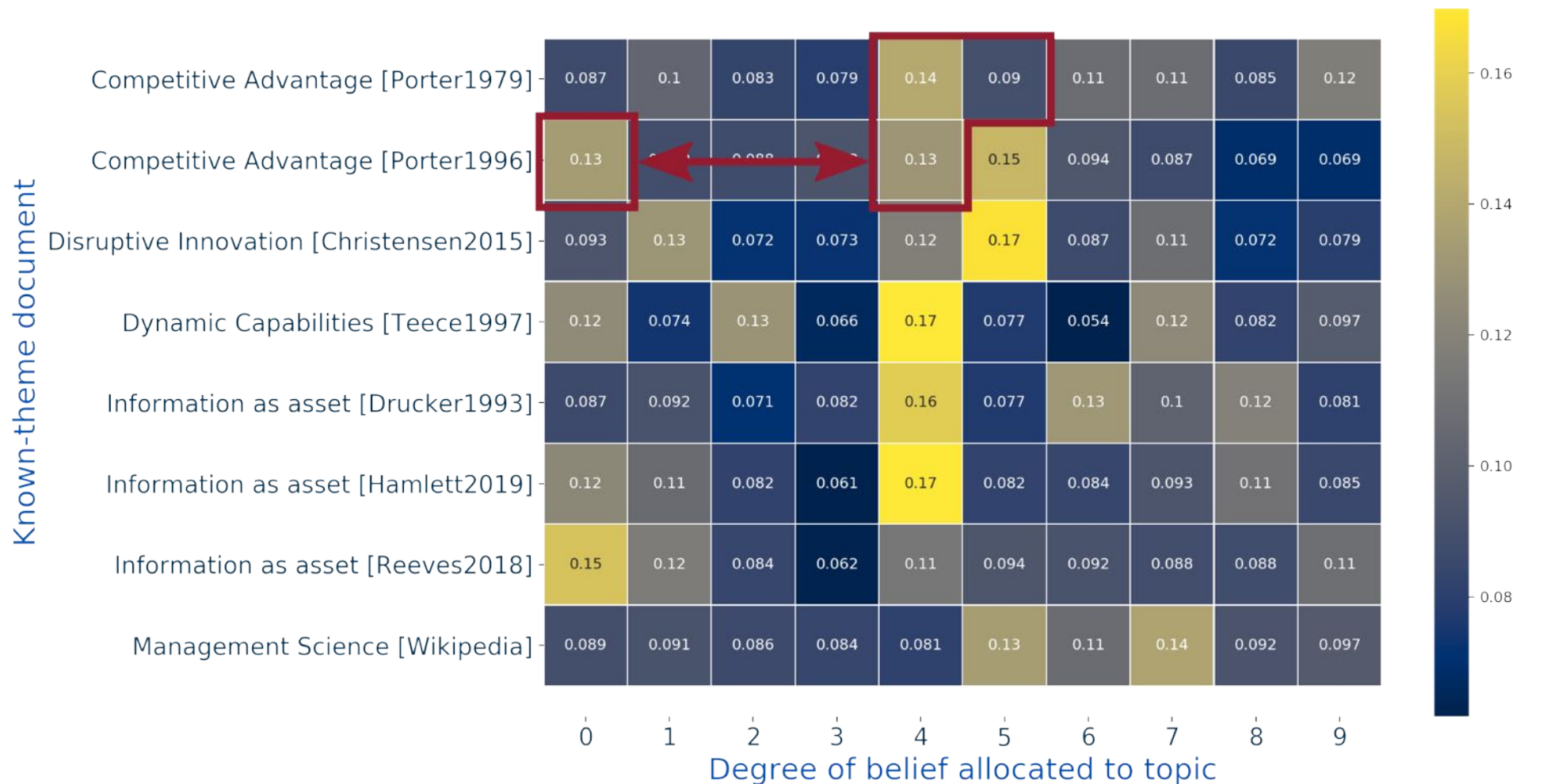
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Theme ②: *Disruptive Innovation* overlaps with *Competitive Advantage.*

Known-theme document

	0	1	2	3	4	5	6	7	8	9
Competitive Advantage [Porter1979]	0.087	0.1	0.083	0.079	0.14	0.09	0.11	0.11	0.085	0.12
Competitive Advantage [Porter1996]	0.13	0.089	0.088	0.093	0.13	0.15	0.094	0.087	0.069	0.069
Disruptive Innovation [Christensen2015]	0.093	0.13			0.17	0.087	0.11	0.072	0.079	
Dynamic Capabilities [Teece1997]	0.12	0.074	0.13	0.066	0.17	0.077	0.054	0.12	0.082	0.097
Information as asset [Drucker1993]	0.087	0.092	0.071	0.082	0.16	0.077	0.13	0.1	0.12	0.081
Information as asset [Hamlett2019]	0.12	0.11	0.082	0.061	0.17	0.082	0.084	0.093	0.11	0.085
Information as asset [Reeves2018]	0.15	0.12	0.084	0.062	0.11	0.094	0.092	0.088	0.088	0.11
Management Science [Wikipedia]	0.089	0.091	0.086	0.084	0.081	0.13	0.11	0.14	0.092	0.097

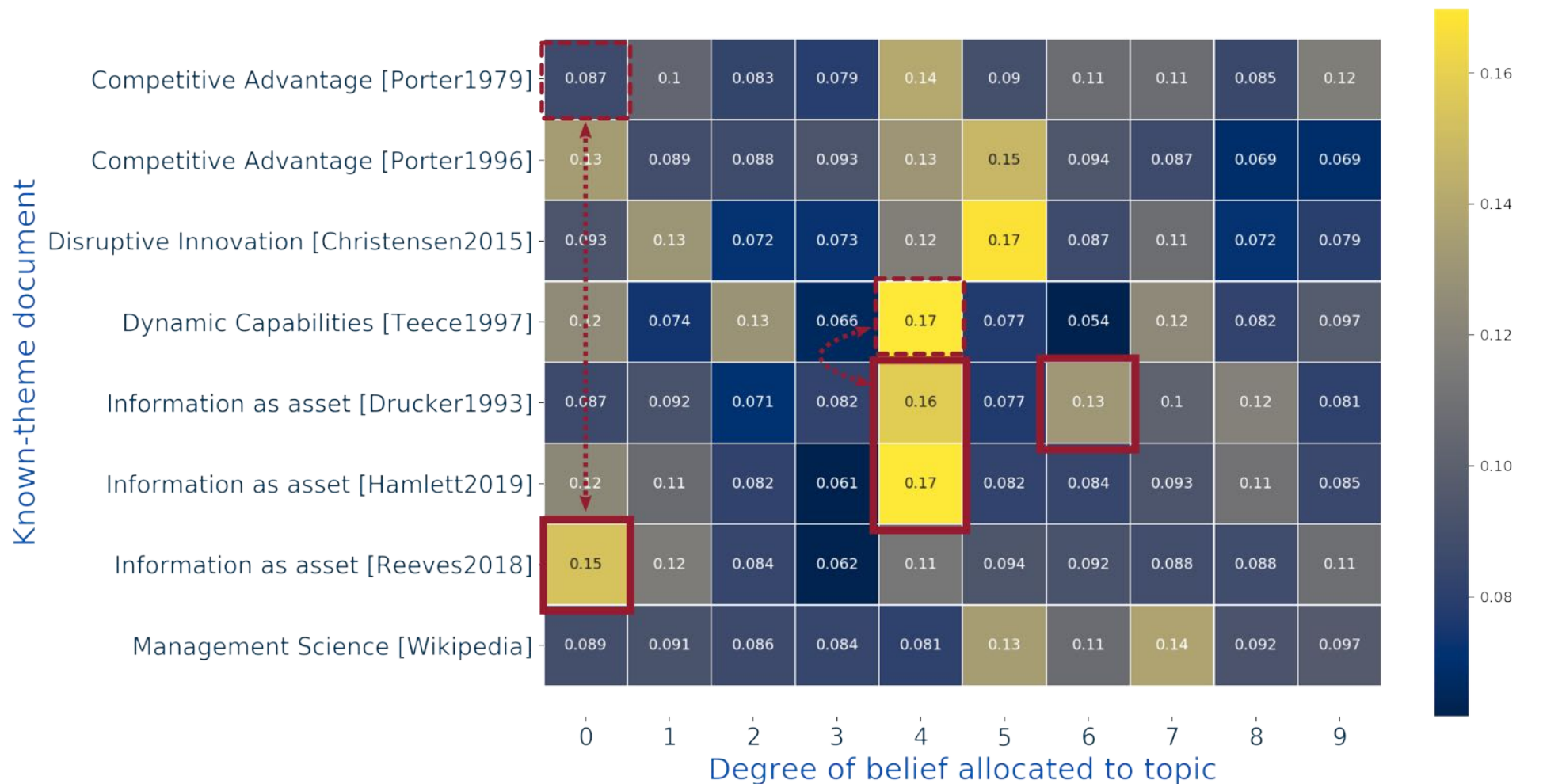Degree of belief allocated to topic

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Theme ③: *Dynamic Capabilities* overlaps with some of *Competitive Advantage*'s strongest signals.
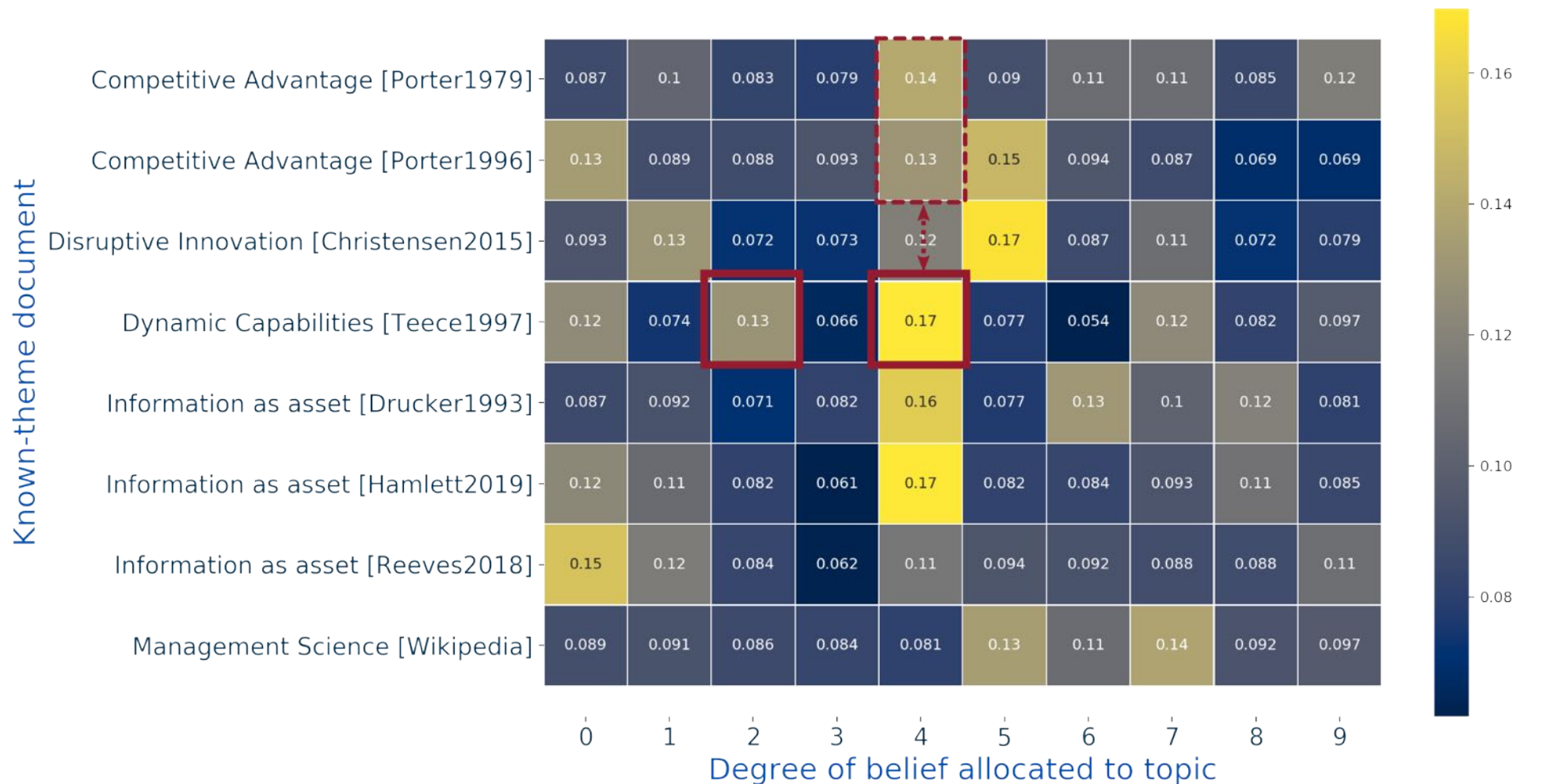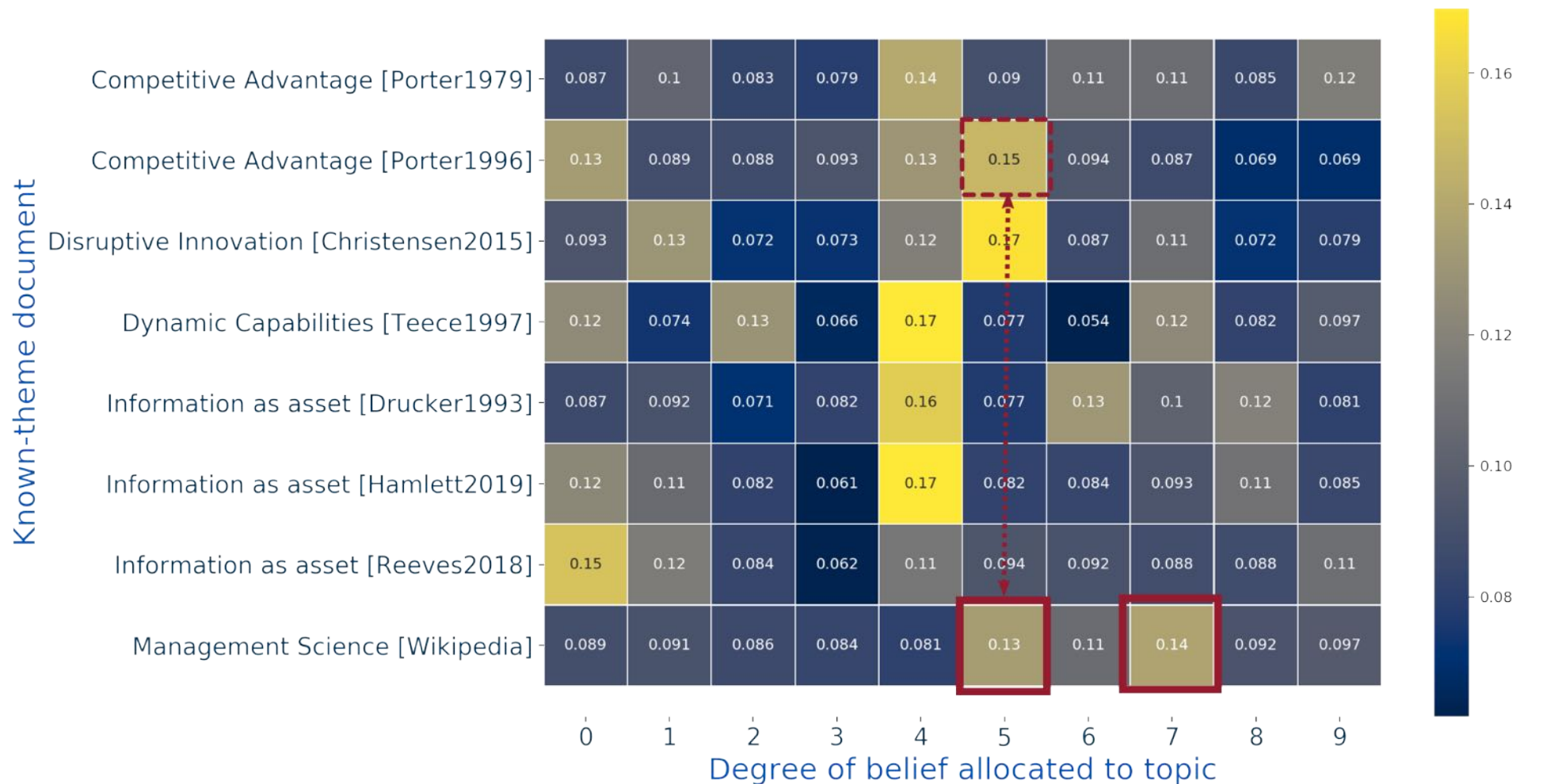
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Theme ④: *Information as an Asset* is closely aligned to *Dynamic Capabilities*.

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Theme ⑤: *Management Science* is largely distinct, with some overlap with *Competitive Advantage.*

Known-theme document (y-axis)

Degree of belief allocated to topic (x-axis)

	0	1	2	3	4	5	6	7	8	9
Competitive Advantage [Porter1979]	0.087	0.1	0.083	0.079	0.14	0.09	0.11	0.11	0.085	0.12
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