Organizational structure and the aggregation of individual-level beliefs

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What is information aggregation

- Anytime \( N \) individual-level opinions are converted into one organization-level decision

- Consistent with central concepts of the Carnegie tradition
  - Organizations as information processing devices
  - Organizational structure as who reports to whom + process used to make decisions
Why information aggregation is relevant

- Information aggregation is pervasive:
  - TMTs, boards of directors, partners in a VC fund

- Particularly pervasive in strategic decision-making:
  - The more relevant a decision, the more likely that that decision will not be made by a single individual

- Allows to compare the performance of very different organizational structures:
  - Hierarchies, Committees, Markets, Individuals

- Sheds light on important open questions:
  - Rumelt, Schendel, and Teece (1994:42): one fundamental question of strategy is how firms make decisions
  - Finkelstein, Hambrick, and Cannella (2009:115): there is a huge gulf between executive characteristics and organizational outcomes
I am not an expert in either Marketing or Engineering. What should I do?

- Do what the most relevant VP is telling me? (Delegation)
- Approve only if both agree? (Unanimity)
- Average their opinions? (Averaging)

This project will be a great success

This project will be a moderate failure
Research questions

1. Which decision-making structure is most appropriate for which environment?

2. Are there situations where a structure employing individuals with flawed mental representations can perform as well as an individual with a correct mental representation?

3. The opposite: Are there situations where the only way to achieve high performance is by relying on individuals with the correct mental representation?
Model

1 Environment

\[ y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1 x_2 + \varepsilon \]

(munificence) (dominance) (complexity) (uncertainty)

2 Projects

\[ y^A = \beta_0^A + \beta_1^A x_1 + \varepsilon \]

\[ y^B = \beta_0^B + \beta_2^B x_2 + \varepsilon \]

(that have characteristics)

3 Individuals

(that have mental representations and have opinions about the projects)

Individuals estimate their mental representation based on the N projects they have seen in the past (N = experience)

4 Structures

(that aggregate opinions)

Delegation: approve if \((D < 0 \text{ and } \hat{y}_A > 0)\)

or if \((D \geq 0 \text{ and } \hat{y}_B > 0)\)

Unanimity: approve if \(\hat{y}_A > 0 \text{ and } \hat{y}_B > 0\)

Averaging: approve if \((\hat{y}_A + \hat{y}_B)/2 > 0\)

5 Organizational Performance

Average quality of approved projects under a given structure \(s\) in a given environment \((M,D,K,U)\)

employing individuals with experience \(N\)

\[ \pi_s(M,D,K,U,N) = \frac{\Sigma y}{\# \text{ of screened projects}} \]
What is the best performing structure as a function of the environment

<table>
<thead>
<tr>
<th>Dominance ($D = -1$)</th>
<th>No Dominance ($D = 0$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Uncertainty ($U = 0.8$)</td>
<td></td>
</tr>
<tr>
<td>Unanimity</td>
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</tr>
<tr>
<td>Low Uncertainty ($U = 0.2$)</td>
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</tbody>
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Complex interactions, non-trivial results
What is the underlying mechanism: matching environments to structures

The environment’s parameters \((M,D,K,U)\) affect the location of good and bad projects in “project space”

- Delegation
- Unanimity
- Averaging

A structure defines the shape of a project selection area

Performance depends on choosing the structure that makes the least errors in a given environment

<table>
<thead>
<tr>
<th>Best structure</th>
<th>Delegation</th>
<th>Unanimity</th>
<th>Averaging</th>
<th>Generalist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archetypal project space</td>
<td>One dimensional</td>
<td>Mostly negative</td>
<td>Mostly positive</td>
<td>Diagonal</td>
</tr>
<tr>
<td>Environmental conditions leading to such a project space</td>
<td>High ([D]) and Low ([U]) and Low/([M]) and High ([K])</td>
<td>High ([D]) and Low ([U]) and High ([K]) and Low ([M])</td>
<td>High ([D]) and Low ([U]) and High ([K]) and High ([M])</td>
<td>Low ([D]) and Low ([U]) (unless High ([K]) and Med ([M])</td>
</tr>
</tbody>
</table>
**When do generalists add value?**

Generalist: individual with the right mental representation, \( y^G = \beta_0^G + \beta_1^G x_1 + \beta_2^G x_2 + \beta_3^G x_1 x_2 + \varepsilon \)

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**Diagram:**
- **Dominance (\( D = -1 \))**
  - High Uncertainty (\( U = 0.8 \))
  - Low Uncertainty (\( U = 0.2 \))
- **No Dominance (\( D = 0 \))**
  - Generalists underperform structures
  - Generalists outperform structures
  - Steve Jobs
Conclusions

1. There are some non-trivial interactions between the environment, decision-making structure, and mental representations

2. In many cases, structures can fully compensate for flawed mental representations

3. In some cases (low $U$, high $K$, and medium $M$) only generalists can achieve high performance

4. Information aggregation is a promising and underexplored research avenue