“Strategic Complexity”

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Strategic Complexity

Motivating questions:

- Do we have excessive complexity of products?
- Can one rationalize the producer strategically complexifying the product even if buyers are fully rational?
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Model in a nutshell:

- Agent with private info about her type (aligned/misaligned) chooses two hidden actions: (quality y, complexity κ).
- Principal observes a two-dimensional signal.
    - Continuous signal z about complexity κ.
    - Binary signal S about product quality.
- Principal accepts the product iff her expected payoff above ω_0.

Key Results

Applications:

- Agent – financial advisor, principal - client.
- Agent – bank, principal – retail investor.
- Agent – policy-maker, principal – median voter.

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Key results:

1. Agent may choose to obfuscate the product even if the principal is rational.
2. Complexity is not necessarily a feature of bad products.
3. Principal's belief about agent's quality $\uparrow$ $\Rightarrow$ quality $\uparrow$, complexity $\uparrow$
4. Higher competition $(\omega_0) \Rightarrow$ quality $\uparrow$, complexity $\downarrow$.

Outline of Discussion

1. Simple models illustrating the effect.
   - The authors' model is much richer.
2. Comments.

Simple Model with Uninformed Agent

Product with quality p:

p

$\theta = G: (U_P, U_A) = (1,1)$

1-p

$\theta = B: (U_P, U_A) = (-1,1)$

Simple Model with Uninformed Agent

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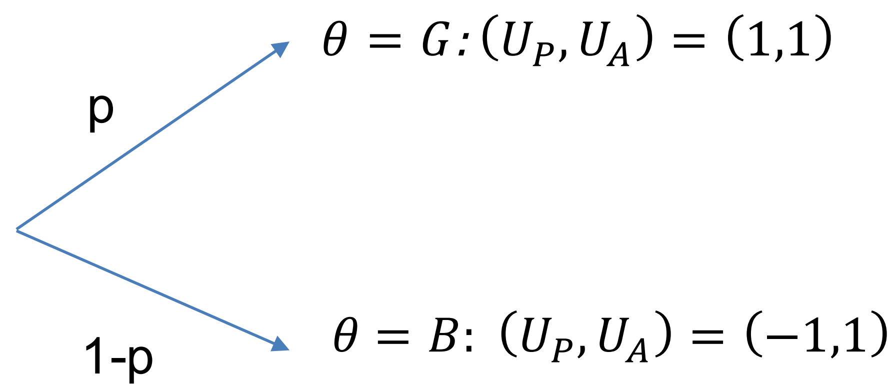

- Principal observes signal $s \in \{G, B\}$ with $\Pr(s \neq \theta) = z$ before deciding accept/reject.
- Agent chooses $z \in [0, {}^1/_2]$ and announces it to the principal.

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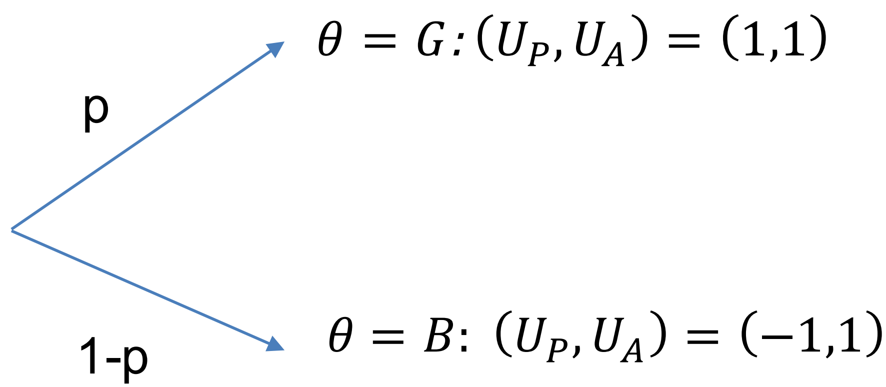

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- Unlike in the model:
    - Complexity is perfectly observed.
    - Product quality is given exogenously.

Simple Model with Uninformed Agent (cont'd)

If $2p - 1 \geq \omega_0$, then $z = {}^1\!/_2$ (max complexity).

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If $2p - 1 < \omega_0$, then agent's problem:

$$\max_z \Pr(s = G) = p(1 - z) + (1 - p)z$$

$$\text{subject to } \frac{(1-z)p - z(1-p)}{(1-z)p + z(1-p)} \geq \omega_0.$$

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Solution:

- If $p > \frac{1}{2}$, then $z = 0$ (max transparency).
- If $p < \frac{1}{2}$, then z is highest at which the constraint holds.

Simple Model with Uninformed Agent (cont'd)

Implications of the simple model:

1. Complexity is non-monotone in product quality (p).
   - Seller with very high p chooses high complexity.
2. Higher $\omega_0 \Rightarrow$ complexity (weakly) declines.
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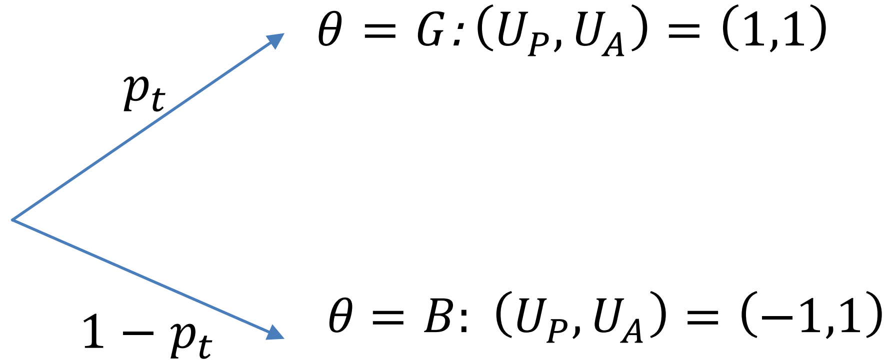
Note: The agent can do even better if she could create asymmetric noise (Kamenica Gentzkow 2011).

- Make bad signal fully informative about bad state; good signal just enough informative about the good state for the principal to break even.

Introduce Private Information of the Agent

Two equally likely types, G and B, with $p_G > {}^1/_2 > p_B$:



- Agent privately observes p_t and privately chooses z_t.

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If $p_G + p_B - 1 \geq \omega_0$, then non-responsive equilibrium exists:

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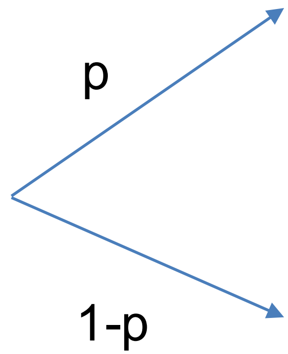
Agent's private info + lack of observability of complexity $\Rightarrow$ a force for bad types to be more complex than good types.

- Bad types want to max the chances of being confused for good types.

Introduce Endogenous Asset Quality

Go back to the model w/o private info:



$\theta = G: (U_P, U_A) = (1,1)$

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- Agent privately chooses p at convex cost $c(p)$.
- Agent chooses $z \in [0, {}^1\!/_2]$ and announces it to the principal.
- Unlike in the model:
  - Complexity is perfectly observed.

Introduce Endogenous Asset Quality (cont'd)

Equilibrium (in the range p low enough):

$$\frac{z}{1-z} = \frac{p}{1-p}\frac{1-\omega_0}{1+\omega_0} \qquad \text{(P accepts)}$$

$$c'(p) = 1 - 2z \qquad \text{(A's IC)}$$

Higher $\omega_0 \Rightarrow$ lower complexity z (to persuade the principal) $\Rightarrow$ higher incentive to produce quality product.

C1: Role of Private Information

Private information of the sender (aligned/misaligned type) is an important feature of the model.

- Natural in many applications (e.g., financial advising)
- It is also an important theoretical contribution to the existing literature on persuasion.

It would be helpful to highlight what implications rely on private information of the agent.

- Maybe solve the model with a symmetrically informed and partially biased agent as a benchmark?

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In the model, complexity is a hidden action of the agent.

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- Good type can separate from the bad type via transparency.
- Single-crossing: Bad type loses more from transparency because she is less likely to generate a good signal.

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- Single-crossing: Bad type loses more from transparency because she is less likely to generate a good signal.

It would be helpful to clarify/motivate observability assumptions.

C3: Applications

No transfers – important assumption in the model:

- Agent only cares about probability that the principal accepts.
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- The agent can choose high transparency and charge a high price.

In what applications is the assumption of no transfers reasonable?

- Probably not in bank/retail investor application.
- Probably yes in policy-maker/voter application.

C4: Competition

Competition is modelled as an increase in the principal's outside option ω_0.

- Nicely microfounded with a search model.
- Higher competition reduces complexity.

I wonder if other models of competition can yield the opposite implication:

- Competition $\Rightarrow$ product differentiation (e.g., Shaked Sutton, 1982).
- Giving a more complex product (e.g., more contingencies) can be a way to differentiate the product.

C5: Other Comments

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- A bit hard to think through. Does it map to an equivalent one-dimensional signal?

It seems that complexity is more about the cost of information acquisition for the principal than about the noise of a free signal.

- Are these two problems identical?

Conclusion

- A very nice paper with clear new theoretical contribution (sender's private info in persuasion) and practical relevance.
- Comments and suggestions:
  1. Highlight the implications of private information of the agent (vs. a model with all other elements).
  2. Examine the role of the assumption that complexity is a hidden action.
  3. Think through what applications are a good fit.
  4. Examine/discuss what would happen under other notions of competition.