Class 10 - Techniques III - Mediation

The logic of mediation
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Performing a mediation analysis
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Applications
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General Discussion
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Preparation for next class
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Agenda

- The logic of mediation: what, why, when, how (30 minutes)

- Application paper discussion (30 minutes)

- *Break*

- Replication presentation (Group 7-9-11; 40 minutes)
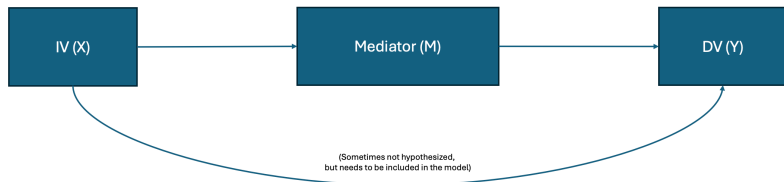
- General discussion (15 minutes)

The logic of mediation

What is mediation?

In all instances, mediational models advance an X -> M -> Y causal sequence, and seek to illustrate the mechanisms through which X and Y are related. (Mathieu and Taylor 2006)

What is medition?

Nomological network view:

Regression model view:

$$Y = \beta_0 + \beta_1 X + \beta_2 M + \epsilon$$

$$M = \beta_3 + \beta_4 X + \epsilon_M$$

Why mediation?

- Provides direct evidence for a theoretical claim

    - "We submit that inferences of mediation are founded first and foremost in terms of theory, research design, and the construct validity of measures employed, and second in terms of statistical evidence of relationships." (Mathieu and Taylor 2006, 1032)

    - Allows for assessment of causal effects via the front door criterion (Pearl 2001, 81)

- Sophisticated tools allow for complex inferences

    - Establishment of direct and indirect effects for latent variables (Williams, Vandenberg, and Edwards 2009)

    - Partitioning of effects through multiple causal pathways

When is mediation appropriate?

Explaining "how" and showcasing mechanisms:
$Y = \beta_0 + \beta_1 X + \beta_2 M + \epsilon$

Partitioning total and indirect effects: Comparing effect sizes
between $Y = \beta_0 + \beta_1 X + \beta_2 M + \epsilon$ and $Y = \beta_0 + \beta_1 X + \epsilon$

Transmitting the influence of instruments: $Innovation =$
$\beta_0 + \beta_1(EquitySplits) + \beta_2(MembershipChange) + \epsilon$;
$MembershipChange = \beta_3 + \beta_4 EquitySplit + \epsilon$

Isolating mechanisms through interventions:
$LightOn = \beta_0 + \beta_1 Power + \beta_2(Switch = on) + \epsilon$

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Performing a mediation analysis

How do you perform a (basic) meditation analysis?

1. Articulate the theoretical justification for a mediational inference.

2. **Clearly** make your prediction as a hypothesis.

3. Run a sequence of regressions in line with your intended inference (Mathieu and Taylor 2006) and extract relevant effects

4. Perform statistical inference (t-tests, indirect effect tests)

5. Illustrate direct and indirect effects

Deep dive: Articulate your theoretical justification

In short, no statistical analysis can unequivocally differentiate one causal sequence from another. Theorists and researchers must then rely on other means to justify the sequence of effects. The most valuable bases to advance such inference come from: (1) experimental design features; (2) temporal precedence; and (3) theoretical rationales. (Mathieu and Taylor 2006, 1033)
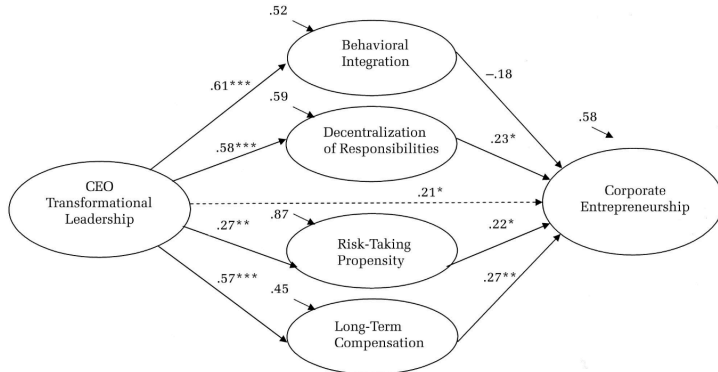
Deep dive: Clearly make your prediction as a hypothesis

It is critical when making an argument for mediation that you specify what you mean. Following Mathieu and Taylor (2006), are you proposing:

- A full mediation, where the mediating variable fully captures the effect of the IV on the DV?

- A partial mediation, where the mediating variable captures, some but not all, of the effect?

- An indirect effect, whereby the IV only has an effect on the DV through its influence on the mediator?

Illustrating a mediation: Indirect effects

FIGURE 1
Final Model[a]

[a] Standardized parameter estimates. $n = 152$. This is a simplified version of the actual model. It does not show indicators, error terms, exogenous factor variances, nor control variables. Solid arrows represent hypothesized paths; dotted arrow represents a path that was not hypothesized.

Things can get crazy (again)!

- Multiple mediators (either in parallel (Ling et al. 2008) or in sequence)

- Mediated moderation and moderated mediation

- As with complex moderation models, can you explain what you are doing?

"Generalizing" mediation: SEM

I have given you two readings (Williams, Vandenberg, and Edwards (2009) and Ling et al. (2008)) to help you dip your toes into the waters of structural equation model (SEM)

This is a fundamentally different way of looking at data, which seeks to compare an observed covariance matrix versus a "model implied" covariance matrix built from the relationships included or excluded from an SEM model (which can include a structural as well as a measurement model component)

The technique involves asking how many connections can be "pruned" without making the model fit worse - in other words, the more $\beta_i = 0$, the better!

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Alternative analyses

- Structural equation modeling (Williams, Vandenberg, and Edwards (2009))

- Non-linear causal models and Bayesian networks (Pearl (2001))

- Hidden Markov models

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Applications

Application readings

Let's level-set people's familiarity with these pieces.

- Ling, Y., Simsek, Z., Lubatkin, M. H., & Veiga, J. F. 2008. Transformational Leadership's Role in Promoting Corporate Entrepreneurship: Examining the CEO-TMT Interface. Academy of Management Journal, 51(3), 557-576.

- Fox, B. C., Simsek, Z., & Heavey, C. 2022. Top Management Team Experiential Variety, Competitive Repertoires, and Firm Performance: Examining the Law of Requisite Variety in the 3D Printing Industry (1986–2017). Academy of Management Journal, 65(2), 545-576.

Ling et al (2008)

- What was this paper about?
- What were the findings?
- What was the method?
- What makes sense? What was confusing?

TRANSFORMATIONAL LEADERSHIP'S ROLE IN PROMOTING CORPORATE ENTREPRENEURSHIP: EXAMINING THE CEO-TMT INTERFACE

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ZEKI SIMSEK
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MICHAEL H. LUBATKIN
University of Connecticut
and
EM Lyon

JOHN F. VEIGA
University of Connecticut

Research about transformational CEOs' impact on firm-level outcomes, particularly corporate entrepreneurship, has been equivocal, partially because the underlying mechanisms remain largely unexplored. Given that the individuals most closely influenced by a firm's CEO are its top management team (TMT) members, we focus on the CEO-TMT interface as a salient intervening mechanism. We posit that transformational CEOs influence TMTs' behavioral integration, risk propensity, decentralization of responsibilities, and long-term compensation and that these TMT characteristics impact corporate entrepreneurship. Data from 152 firms supported most of our hypothesized links, underscoring how the CEO-TMT interface helps explain transformational CEOs' role in promoting corporate entrepreneurship.

Transformational leaders are drawn by the need to transform individuals, teams, and firms by going beyond the status quo and, in so doing, affect their firms' ability to innovate and adapt. Widely examined as a multifaceted meta-construct, transformational leadership consists of exhibition of four interdependent and mutually reinforcing attributes. These are (1) charisma: creating and presenting an attractive vision of the future; (2) inspirational motivation: energizing followers to go beyond self-interest; (3) intellectual stimulation: stimulating followers to challenge assumptions and view problems from new perspectives; and (4) individualized consideration: focusing on follower development by providing support, encouragement, and coaching (Bass, 1985).

Described as the "givers" and "definers" of adaptive organizational culture (Waldman & Yammarino, 1999), CEOs who are transformational

leaders are believed to induce organization members to constantly anticipate and adapt to environmental change (Jung, Chow, & Wu, 2003; Waldman, Javidan, & Varella, 2004). For example, Kotter suggested that a firm's entrepreneurial proclivity is enhanced to the extent that a transformational vision seeps into the very fiber of the firm to become "the way we do things around here" (1995: 652). Transformational CEOs are also believed to enhance this proclivity by being enthusiastic about innovation (Howell & Higgins, 1990) and by showing how volatility in the firm's competitive environment can be turned into a vision of opportunity (Avolio, Zhu, Kho, & Puja, 2004).

It would seem to follow then that transformationally led firms are more likely to engage in corporate entrepreneurship, defined by Zahra (1996) as the sum of a firm's product innovation, business venturing, and strategic renewal activities. Yet researchers have been equivocal about the general importance of CEOs' roles in affecting such firm-level outcomes. Some have suggested that CEO impact may be, at best, minimal (e.g., House & Aditya, 1997; Meindl, 1998) or concluded that "the top

Fox et al. (2022)

- What was this paper about?
- What were the findings?
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TOP MANAGEMENT TEAM EXPERIENTIAL VARIETY, COMPETITIVE REPERTOIRES, AND FIRM PERFORMANCE: EXAMINING THE LAW OF REQUISITE VARIETY IN THE 3D PRINTING INDUSTRY (1986–2017)

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Clemson University

CIARAN HEAVEY
University College Dublin

This study develops and tests a thesis derived from the law of requisite variety. We contend that the greater the experiential variety of a top management team, the more likely it is that the complexity and consistency of the firm's competitive repertoire will be calibrated to relevant external variety. In addition, for firms that achieve such calibrated repertoires, we expect that their performance will be superior to that of their peers. We then integrate these arguments and examine whether top management team experiential variety indirectly, through calibrated repertoires, contributes to firm performance. Analyzing hand-collected data for firms operating in the 3D printing industry over the past three decades (1986–2017), we find support for the overall thesis and associated hypotheses. The discussion section elaborates on the study's contributions, limitations, and future research potential.

The law of requisite variety (LRV) often informs the argument that top management teams (TMTs) with greater experiential variety draw upon a rich reserve of cognitive resources and behavioral routines to enact adaptive competitive repertoires that enhance firm performance (Bogner & Barr, 2000; Connelly, Tihanyi, Ketchen, Carnes, & Ferrier, 2017; Ferrier, 2001; Lyon & Ferrier, 2002; Ndofor, Sirmon, & He, 2015). The core logic is that experiential variety within the upper ranks of the firm facilitates efficacious adaptation by enabling a requisite level of variety in competitive repertoires to cope with external variety (Ashby, 1956; Poulis & Poulis, 2016). TMTs equipped with less variety encounter greater difficulty enacting adaptive repertoires, thereby adversely impacting firm performance (Ferrier,

2001; Ketchen, Snow, & Hoover, 2004; Ndofor et al., 2015). So well rehearsed is this logic that it has attained a canon-like status in competitive dynamics and upper-echelons research.

However, past studies have oversimplified and insufficiently elaborated upon the LRV, in three respects. First, prior studies have suggested that TMT experiential variety enables adaptive competitive activity, as embodied by competitive repertoires. But previous studies have overlooked a subtlety when applying the LRV; it is not the *absolute* level of behavioral variety that matters, but, rather, whether the *requisite* level of variety is achieved. Requisite variety occurs when competitive repertoires are *calibrated* with the variety present in the competitive environment (Boisot & McKelvey, 2011; Heiner, 1983; Poulis & Poulis, 2016). In its elemental form, the LRV suggests that a system's performance is dependent on its capacity to match external variety with requisite internal variety (Ashby, 1956; Poulis & Poulis, 2016). Thus, the LRV does not suggest that competitive repertoires are needlessly complex or simple; they need only match—that is, be calibrated to—external variety.

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Break

COFFEE BREAK

Replication Presentation

- Replication: Fox, B. C., Simsek, Z., & Heavey, C. 2022. Top Management Team Experiential Variety, Competitive Repertoires, and Firm Performance: Examining the Law of Requisite Variety in the 3D Printing Industry (1986–2017). Academy of Management Journal, 65(2), 545-576.

General Discussion

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Techniques IV: Endogeneity

1. Cuervo-Cazurra, A., Andersson, U., Brannen, M. Y., Nielsen, B. B., & Reuber, R. A. 2016. From the Editors: Can I trust your findings? Ruling out alternative explanations in international business research. Journal of International Business Studies, 47(8), 881-897.

2. Hamilton, B. H., & Nickerson, J. A. 2003. Correcting for endogeneity in strategic management research. Strategic Organization, 1(1): 51-78.

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Techniques IV: Endogeneity

Applications:

3. Bascle, G. 2008. Controlling for endogeneity with instrumental variables in strategic management research. Strategic Organization 6(3): 285-327.

4. Replication: Fox, B. C., Simsek, Z., & Heavey, C. 2023. Venture team membership dynamics and new venture innovation. Strategic Entrepreneurship Journal.

References

Ling, Yan, Zeki Simsek, Michael H. Lubatkin, and John F. Veiga.
    2008. "Transformational Leadership's Role in Promoting
    Corporate Entrepreneurship: Examining the CEO-TMT
    Interface." *Academy of Management Journal* 51 (3): 557–76.

Mathieu, John E., and Scott R. Taylor. 2006. "Clarifying
    Conditions and Decision Points for Mediational Type Inferences
    in Organizational Behavior." *Journal of Organizational
    Behavior* 27 (8): 1031–56.

Pearl, Judea. 2001. *Causality- Models, Reasoning, and Inference.*

Williams, Larry J., Robert J. Vandenberg, and Jeffrey R. Edwards.
    2009. "12 Structural Equation Modeling in Management
    Research: A Guide for Improved Analysis." *Academy of
    Management Annals* 3 (1): 543–604.