Managing Medicaid Misclassification:
Using Simulation Techniques to Identify Administrative Leverage Points in Policy Implementation

Lisa A. Frazier, MPH
John Glenn College of Public Affairs

Introduction

Every year, more than 70 million people in the US – one-third of all children and one-fifth of all adults – are covered by Medicaid, the jointly administered state-federal health insurance plan for low-income and disabled individuals (Office of the Actuary, 2016). As an entitlement program, Medicaid employs a *means test* to define eligibility for the program; if an individual is determined to be eligible, s/he is entitled to enrollment in the program and receipt of its benefits. However, monthly enrollments fluctuate as people experience changes in their income, health status, and family composition, and as State programs work to keep up with review and processing of applications, claims, and renewals. In a program as large and complicated as Medicaid, it is thus difficult for States to determine who is eligible and who is not. As a result, all State programs report varying levels of coverage *take-up* (proportion of eligible residents who enroll in the program), *churn* of beneficiaries (movement of individuals on-and-off the program over long periods of time), and *fraud* (ineligible residents enrolled in the program).

These program *classification errors* result in financial and health care instability for families and individuals who experience them, and unpredictability and inefficiency in the State's administrative tasks and budgets. As the nation's (and most States') largest single health insurer, and a program that accounts for more than a quarter of total State spending (Rudowitz, 2016), Medicaid's operations are of great concern to public administration. Given the seemingly straightforward rules of the program – i.e., if you meet these criteria, you are entitled to benefits – and the problems associated with classification error, the phenomena of low take-up, churn, and fraud are often referred to as "unintended consequences", "implementation failures", or "inefficiencies" in the program. Seeking to find solutions to these problems, researchers and administrators of State Medicaid programs have spent considerable time and resources asking question such as, *How can States eliminate fraud? What are the characteristics of the people most likely to churn, miss take-up, or commit fraud? Why do different States have different rates of churn, fraud, take-up?*

Gaps in Literature on Classification Error

Despite an abundance of research geared toward answering questions about program enrollment (in Medicaid as well as other public benefit programs), our understanding about the causes and consequences of program classification error remains limited. This shortfall limits our ability to identify policy levers that might be used to minimize error and (arguably) improve system performance. Existing studies on program enrollment share three primary characteristics that limit their ability to inform the administration of Medicaid policy.

1. Estimate distribution, not dynamics.

   While most research refers to "take-up rate" or "churn rate" as the measure of interest, what is actually estimated and reported is the *prevalence* or *proportion* of people who fall in a particular enrollment-eligibility category at a particular time. This is useful information to have, but it is distinct from the *rate* at which people move in or out of a category. Snapshots of prevalence over time fail to illuminate the core dynamics of the Medicaid enrollment process, i.e., how people move across categories over time.

2. Describe who; do not explain why.

   While existing studies provide some insight into *who* falls into different enrollment classification states, they do not shed much light on *how* people get there. In part, this is because they model the outcome of interest as a function of individual characteristics (e.g., gender, ethnicity, employment, health status). But the means test is not instantaneously and omnisciently applied to individuals based on their characteristics, it is a rule/institution implemented through the State. When structural elements of the enrollment process such as eligibility criteria and continuous enrollment period *are* included (Herd, DeLeire, Harvey, & Moynihan, 2013), they are treated as exogenous variables to be controlled, rather than contextual factors affecting decision making and behavior. By focusing on individuals rather than policies, current research fails to provide insight about the origins of enrollment patterns, including classification errors.

3. Model discrete outcomes; not related patterns.

   In existing research, the outcome of interest in any given study is either take-up, missed take-up, fraud, or churn. This approach ignores the fact that the enrollment phenomena are related through the program structure, so a policy change affecting the level of one outcome is likely to have affects on the others, as well. For example, if the State makes changes to the enrollment process that results in a greater proportion of eligible individuals taking up coverage, a smaller proportion of the population will miss taking up. Such a policy might also result in fewer people moving on and off the program. It is valuable to decision makers to know how structural changes will affect *all* of the enrollment patterns, not just one in particular.

Based on these characteristics, the existing literature could be organized in the following way:

Figure 1. Summary of Existing Medicaid Enrollment Research

Enrollment Outcome Classifications (distribution at given time, *t*)		Population Enrolled	
		Yes	No
Population Eligible	Yes	Proportion taking up	Proportion missing take-up
	No	Proportion 'committing fraud'	Proportion with other coverage or uninsured
Compared to *t*-1, proportion of population moving from enrolled to unenrolled (or vice versa) are churning			

The characteristics outlined above reflect a more general limitation of the current research on program enrollment: an inability to capture and model the complexity of the Medicaid system. The operating assumptions of these studies reflect an underlying Cartesian logic; that is, they take the perspective that the way to understand some aspect of the world is to break it into its constituent parts and study them piece by piece in order to determine cause and effect. This approach certainly has its place in scientific inquiry, and has provided the basis for much of what we understand about many social phenomena, including Medicaid enrollment. However, deterministic, closed-form, static perspectives and analytic models make it difficult to capture the complexity and dynamics of implementing a benefit program. In breaking time into snapshots, feedback dynamics into linear cause and effect, people into characteristics, contexts into controls (variables), and compound patterns into discrete outcomes, existing studies seek to simplify the complexity that is a "profoundly characteristic feature of the real" (Rescher, 1998, p. xiii). Unfortunately, the behavior of complex systems cannot be perfectly understood just because their constituent parts are. People move within the Medicaid system in different ways over time, through a series of actions and interactions with other actors and rules, within a rich social, economic, and political environment. The enrollment patterns observed in these systems are not just outcomes; they are dynamics. The system is not just multi-actor, multi-rule, or multi-dimensional; it is complex.

Research Questions and Aims

Building on the groundwork laid by previous studies on enrollment and classification errors, this research seeks to examine how people move on and off the Medicaid rolls. In order to fill gaps left by previous research, this study takes a *systems* perspective, focusing on the properties and behavior of the program system *as a whole*, rather than on the behaviors and attributes of the individual parts. From a systems perspective, understanding churn, fraud, and take-up requires direct attention to and representation of the complexity and dynamics of Medicaid enrollment phenomena.

A conceptual model of the Medicaid enrollment system is useful to consider, *What are the characteristics of Medicaid enrollment implementation as a complex human system?* What makes Medicaid enrollment complex? How are actors, institutions, and environments interconnected and how do they interact in this system? What does the structure of the system suggest about how it works and how it behaves?

An operationalization of the conceptual model through a simple system dynamics simulation can be used to understand, *What is the mechanism by which Medicaid program enrollment works?* What are the characteristic processes of this system? How does the feedback structure of the system play out? How do people move on and off the Medicaid program? How do classification errors arise?

By experimenting with and testing assumptions in the system dynamics model, this research seeks to understand, *What are the effects of pulling different policy levers within the Medicaid enrollment system?* How do enrollment patterns change under different eligibility criteria, determination practices, and enrollment procedures and rules? What are the effects of these policies under different environmental and population conditions?

Ultimately, the goal of this research is to provide a model for decision makers to test assumptions and experiment with policy options in the context of diverse State Medicaid programs.

Conceptual model: A recursive framework for implementation

The central claim of this research is that deterministic methods and Cartesian thinking have limited our understanding of classification error in Medicaid enrollment because they frame it as a problematic outcome resulting from an aggregated set of independent variables. Because Medicaid enrollment is an ongoing process involving interactions among a diverse set of actors and institutions within rich environmental conditions, classification error is better understood and investigated as a manifestation of the dynamics that characterize a complex human system. Indeed, this problem is just one of a type of *dilemmas* with which we deal in public administration; i.e., wicked problems that are resistant to technological control or resolution because of complex interdependencies (Churchman, 1967). Traditional Cartesian logic is based on an assumption that complexity must be broken up, reduced, and simplified to be understood and addressed. In contrast, a systems logic holds that the whole is other than the sum of the parts (Koffka, 1935), and as such, its parts and relationships must be studied in context and over time to understand the underlying structure and system behavior.

Rigorous inquiry requires abstraction from reality to a model of some kind in order to be useful (and wrong) (Box & Draper, 1987). Instead of an abstraction of complexity that is reduced down to its parts and the associations among them, a systems perspective requires that an abstraction represent the structural interdependencies and feedback that produce and reproduce system behavior. Additionally, because wicked problems occur within complex systems of human action, they are subject to the law of requisite variety: the possible states of the filter and control mechanism in a system must be greater than or equal to the possible states of the system itself (Ashby, 1956; Beer, 1972).

What makes Medicaid enrollment complex? What are the characteristics of Medicaid enrollment implementation as a complex system?

Medicaid enrollment relies on the means test and its implementation. Implementation is said to begin with the specification of what government is going to do (Smith & Larimer, 2009, p. 155) and end with the effect of the action on society (Mazmanian & Sabatier, 1983). However, public administration scholars widely acknowledge that implementation is neither a linear process, nor a discrete phase in policy or management practice (e.g., deLeon, 1999). The process of implementation is ongoing as rules are defined, enacted, and revisited; and as actors of various kinds interpret, process, and respond to those rules. While scholars commonly refer to implementation as complex, treatment of the phenomena continues to involve a reduction of the complexity into parts related through a deterministic structure (e.g., Sandfort & Moulton, 2015). Similarly, the word "system" is used generically to refer to an institutional or social space, but the structure of that space, its actors, its boundaries, and its behaviors are not specified (e.g., O'Toole, 2000).

A complex system is not just multi-actor, multi-level, or multi-dimensional. The Cartesian approach of adding more variables, nesting them within groups, and measuring assocations, even over time, is complicated, but it is not truly complex. A complex system has these characteristics:

- It includes diverse entities or elements whose actions are interdependent within a contact structure that has broad dimensional boundaries (Miller & Page, 2007).
- Its behavior arises from its endogenous structure. Patterns are difficult to predict or trace back to specific actors, rules, or actions, and system behavior cannot be predicted by the behavior of the individual entities. Higher-order functions and patterns emerge from the interactions (not aggregations) of individual elements (Page, 2010).
- Time and time steps matter because they inform (though do not determine) how interactions occur and patterns unfold. Interactions among elements are not necessarily linear or consistent in their form, so system behavior may change over time and through time. Dynamic interactions make it difficult to assess tradeoffs or identify optima (Miller & Page, 2007).

Additionally, scholars note that social human systems demonstrate the following features:

- The system and the elements within it have purposes, and those purposes likely do not always align. As a result, local and global behaviors may vary widely (Ackoff, 1994).
- The guiding rules and behaviors of the system are adaptive; they change as actors learn (Miller & Page, 2007).

- The system tends to self-organize and reproduce around the diverse, dynamic actions of its elements, making it resilient to perturbations (Miller & Page, 2007; Ackoff, 1994).

These characteristics suggest that many features that are often treated as "control variables" or are left out of a model all together are instrumental to understanding the phenomena of interest. For example, if actors and behaviors are interconnected and interdependent, then economic, political, and social conditions, administrative rules and practices, and sources of learning should all be endogenous elements of any model (theoretical or empirical) of a system. Furthermore, because system behavior arises from its structure, and complex human systems are adaptive and self-organizing, models should allow for both emergent behaviors and emergent (or, more precisely, *latent*) structures to develop. Cartesian models of Medicaid enrollment specify *an* outcome and *a* structure (i.e., functional form relating the variables), which prevents any insights about self-organizing patterns or latent relationships among the system elements.

Since the complexity of our social world is governed by the law of requisite variety, to make a contribution to scholarly and practical knowledge about Medicaid program enrollment, and to address limitations of previous research, a systems conceptualization of enrollment must explicitly represent complexity, specifically by including the following:

1. Rates of change over time.

   While snapshots of the distribution and characteristics of elements within a system may be sufficient to understand variation and associations among those elements, they cannot account for non-linear changes over time or recursive relationships among elements and time. Knowing about the actual *rates* at which people move on and off the Medicaid program is necessary to understanding the core dynamics of the processes of enrollment.

2. Broader explanatory boundaries.

   Complex system behavior is explained primarily through the endogenous structure of the system itself. Thus, institutional arrangements and environmental contexts must be included *with* individual characteristics and behaviors, and their interactions and interdependencies represented through appropriate feedback designations. Because the process of program enrollment involves interaction among these elements, any model of enrollment phenomena that does not include the recursive relationships among beneficiaries and policies in context will fail to illuminate leverage points in the system.

3. Multiple, compound patterns.

   Complex systems demonstrate dynamic behaviors. Some of those behaviors may be deemed problematic because of associated social or economic costs, but ultimately, all behaviors are simply effects of the interconnections and interdependencies among the elements of the system itself. Thus, any changes in the structure of the system that result in changes in one pattern are likely to result in changes in the others. Missed take-up, churn, and fraud are therefore understood as different manifestations of a compound implementation process; a process that also includes the "successful outcomes" of enrollment among eligible individuals and continuous coverage through other insurance.

How can complex human system concepts be formally organized?

Among scholars trained in a Cartesian approach to scientific inquiry, a common concern with systems models is that they are too broad and include too much to be useful, and create analytical problems by including multiple units of analysis. However, systems models can be formalized in logically consistent ways that maintain fidelity of concept and analytic tractability. Bunge's standard model of a concrete system (Bunge, 2004) is an elegant formalization that can be applied in a range of systems contexts:

Figure 2. Bunge's Basic Model of a Concrete System, μ(σ) (Bunge 2004, 188)

μ(σ) = dynamic of{C(σ), E(σ), S(σ), M(σ)},

over time *t*, where the elements of the model are:

C = set of parts or components of the system
E = the collection of environmental items that act on and/or are acted upon by the system
S = the structure or set of bonds or ties that hold the components of the system together; organization, architecture
M = the mechanisms or characteristic processes of the system
And
μ(σ) = self-production and control of system

Instead of a vector of variables that denote the attributes or decisions along one dimensional unit (e.g., a person, an organization), Bunge's model defines a matrix of variables that are organized according to attributes of actor (component), context (environment), action rules (structure), and interaction processes (mechanism). The elements of this matrix necessarily interact dynamically over time; they are not assumed to relate to each other through a pre-defined functional form, which may or may not include a time designation. Lastly, rather than a dependent variable, the "outcome" in Bunge's representation is a compound manifestation of the interaction patterns produced by the elements of the system. With the system itself as the unit of analysis, and distinctions drawn among different levels of action, this formalization *distills* complexity instead of reducing it.[1] *Mechanism* is a particularly useful construct in modeling a complex human system because interaction processes are how learning and adaptation occur.

In this research, instead of modeling churn, take-up, and fraud as discrete phenomena, they are treated as manifestations of a compound self-production pattern in the Medicaid enrollment system. Rather than a means *test*, the mechanism by which people move among eligibility and enrollment states within the Medicaid program system may be thought of as a means *negotiation*. The mechanism is the characteristic interaction processes by which institutional arrangements (eligibility criteria, determination procedures, enrollment period) are negotiated by (and with) individuals (both potential beneficiaries and organizational actors) in the context of social and economic signals (political control, job growth).

The mechanism is the driving force in the system's self-production. Some of the mechanismic (Bunge, 2004) interactions may result in *policy resistance* (Sterman, 2000; Meadows, 1982), intervention-dampening patterns that arise in response to the system itself. For example, while one may think that the Medicaid means test would produce only patterns of proper program classification (i.e., enrollment among eligible individuals, non-enrollment among ineligible individuals), interaction processes drive the production of a compound pattern of classification, which includes some "error" (i.e., enrollment among ineligible individuals, non-enrollment among eligible individuals). This indicates that the typical characterization of these phenomena as unintended consequences, implementation failures, or inefficiencies is flawed because it implies that such outcomes are avoidable; that they are problems to be solved. Mechanistically, that may not be true.

[1] For more on levels of action and distinctions among logical types, see Roach & Bednar, 1997.

Conceptualizing Medicaid program enrollment within a complex human system framework also highlights the lack of conceptual clarity about what the enrollment phenomena are and how they are named. The rates at which individuals *take up* coverage or *miss take up* of coverage is clear enough. However, *fraud* is a loaded term, implying devious behavior and deceitful motivation on the part of the beneficiary. The rate of *spurious enrollment* would more neutrally reflect this manifestation of the system's patterns. While the term *churn* is used in the literature to refer to any kind of movement on and off the program, rates of churn due to a change in *eligibility* are a distinct policy challenge from rates of churn due to *determination* rejection. In addition to conceptual rigor, a systems perspective provides a framework for inquiry that emphasizes hypothesis generation (rather than hypothesis testing) and simulated explorations of *what if* scenarios about how policy decisions might play out in complex systems.

System Dynamics Procedure: Operationalizing a systems model for hypothesis exploration and policy experimentation

Thanks to advancements in computational methods and improvements in computing power, policy scholars now possess the tools to build on the insights gained from deterministic models by simulating the complexity of public program implementation and watching the behavior of the system as a whole. In this research, a system dynamics (SD) model is used to build an empirical proof of the complex human systems concept of Medicaid enrollment. The simulation is useful both for exploring how the mechanism of the Medicaid enrollment system works, and for experimenting with various policy actions to identify possible leverage points in the system.

By expanding the boundaries of the enrollment models to include structural elements as endogenous features of the classification problem, a system dynamics approach allows for the exploration of dynamic complexity and feedback structures that make enrollment patterns difficult to explain or predict. SD modeling may shed light on sources of policy resistance, encourages and supports transparency in assumptions and decision making, produces plausible ranges of outcomes under different assumptions, and demonstrates tradeoffs among various policy options, revealing possible policy leverage points and aiding in real-time decision making.

While systems modeling is different from Cartesian modeling, there is a robust literature of procedures and protocols in systems science. Sterman (2000) serves as a standard in procedure for research using SD methods.

1. *Reference Mode, Dynamic Problem Definition*

   The dynamic problem of interest is how some members of a State population are distributed in enrollment states not consistent with their eligibility status, and how they move among various state of enrollment. Because States have different environmental conditions (economically, politically, socially), different populations, and different eligibility and determination policies, the distribution of their populations across enrollment categories and movement among them is different. All States demonstrate dynamic behavior in terms of Medicaid classification and enrollment over time.

   To be more clear in identifying and reporting the behaviors of interest in this problem, “rate” will refer only to a variable change over time (people/month). *Spurious enrollment* will be used to refer to people who are enrolled in the program, though they are not eligible for it. This to provide a more general description of the state that allows for both motivated action on the part of the individual (“fraud”) and administrative errors made in the determination process. This model will also distinguish between the dynamics of *eligibility churn* and *determination churn* in order to capture movement on-and-off the program that is associated with an individual's changing financial/household conditions (eligibility) and movement associated with errors or delays in reevaluation and enrollment in the program (determination).

2. *Model boundary*

In order to capture the effects of Medicaid eligibility and determination policies on program enrollment and classification dynamics (and the associated costs), the time horizon needs to be long enough to capture delays associated with passage, implementation, and information dissemination regarding changes in policy. From the perspective of the State, a useful initial model would likely need to include 4-5 budget cycles (with each budget period lasting two years). For planning purposes, the time horizon would run from 2002-2042 to include a range of economic and policy changes both historically, and into the future. (Because the origins of the problematic phenomena almost certainly arose shortly after initiation of the program, 1965-1982 could be the start of the time frame, depending on the State of use.) Tracking behavior per month is the relevant time unit because Medicaid enrollments and claims are reported each month.

Figure 3. Model Boundary Chart

Endogenous	Exogenous	Excluded
Federal Medical Assistance Percentage	Population size change Immigration, emigration, Births, deaths	Medicare dual eligible population
Household Impoverishment Rate, Household Recovery Rate	State Basic Health Plan	Generosity/types of benefits (services covered)
State Legislature Party Control	Number of providers	
Gubernatorial Party Control	Monthly unemployment	
Eligible, Unenrolled Population	Median household income	
Ineligible, Unenrolled Population	Managed Care Penetration (%)	
Enrolled Population		
Applicant Population		
Application Rates		
Application Approval and Denial Rates		
* Policy variables (see 5. Policy Experimentation)		

Data sources: State statutes on Medicaid (eligibility, determination practices), administrative Medicaid data (applications, enrollments), Census data on income and employment.

3. *Dynamic Hypothesis*

A general systems organization contends that Medicaid classification implementation is characterized as a self-producing and -controlling system of dynamic, recursive processes in which interdependencies among a set of elements – individuals, institutional arrangements, and environments – create multiple related patterns in the classification of citizens over time. Bunge (2004) refers to the compound characteristic process of a system's (re)production as the system's *mechanism*. To capture the ongoing, purposeful processes of both individuals and States reviewing eligibility and benefits, the characteristic process in this model is referred to as the *sorting mechanism* ("means negotiation" in the previous section).

A State's enrolled Medicaid population may be imagined as an accumulation of people inside a bathtub. Previous studies describe who is in the tub (i.e., their gender, age, ethnicity), but provide very little insight on how they flowed in, how long they stay inside, or how they drain out. The number of pipes in and out, and what controls the valves is largely unknown; in other words, the *sorting mechanism* is poorly understood.

Policies are institutionalized, purposeful actions. They are rules, procedures, practices, arrangements, and structures designed to consistently induce and regulate certain behaviors among defined agents. In other words, policies are mechanisms; policy design is mechanism design.

Forms of policy resistance, such as classification error occurring in Medicaid enrollment implementation, arise from the interaction, interdependence, and interconnections among the individuals, the policies regarding eligibility and determination, and the State's economic, political, and social environments, over time. The same mechanism that the State uses to fulfill public service demand through certain feedback structures is also characterized by feedback structures that dampen the intended policy effects, producing resistance in the sorting mechanism. For example, while verification procedures are intended to reduce the incidence of spurious enrollment, they also impose administrative burden (Moynihan, Herd, & Harvey, 2014) on applicants and potential applicants, increasing the incidence of missed take-up.

4. *Formulate, Test SD simulation*

To build confidence in the model's assumptions and specification, the former deputy director of Ohio Medicaid, the executive director of the Joint Legislative Commission on

Medicaid, and several current and former beneficiaries serve as consultants and reviewers of this modeling process. The model will be calibrated to historical Ohio Medicaid data from 2008-2014, then tested by changing assumptions to reflect policy changes made with the expansion of the program in 2014. Additionally, model sensitivity will be tested by changing economic conditions; the goal is to see if (and to what degree) the model reproduces the "automatic stabilizer" effect of Medicaid during a recession.

5. *Policy Experimentation*

Ultimately, the purpose of an SD simulation is to provide a virtual world in which decision makers can explore *what if* scenarios without any social, political, or economic costs. The mechanism by which individuals are sorted through the Medicaid system is policy actionable in two fundamental ways: 1) Through rules relating to eligibility, and 2) through rules relating the application and determination. Drawing on federal guidelines and State statutes over the last 20 years, a range of policy interventions will be tested:

Changes to Eligibility

- Number of eligibility categories (number of different ways an individual can be deemed eligible)
- Income eligibility threshold (percent federal poverty level)

Changes to Application and Determination

- Application method (online, paper application, provider claim, navigator, benefits coordinator)

- Number of questions on application
- Number of application languages available
- Unified application (linked to other public benefit programs)
- Interview required
- Income verification required
- Employment verification required
- Drug test required
- Residency verification required
- Period of continuous enrollment (period without needing to re-apply)
- Enrollment through provider claim (presumptive eligibility)
- Automatic enrollment (administrative enrollment)
- Managed care contracting

Expected Simulation Insights

The goal of this research is to use SD simulation to illuminate and understand the feedback structure and dynamic behavior of the Medicaid enrollment system and its mechanism. This includes insights about:

- *Rates* of take-up, spurious enrollment, missed enrollment, eligibility churn, and determination churn, not just prevalence;
- The flow of citizens across different stages of eligibility and enrollment in Medicaid;
- Estimates of the prevalence, incidence, and duration of enrollment classification outcomes;

- Estimates of the administrative costs associated with distribution and movement of people within the system each month;
- The extent to which observed patterns are manifestations of the mechanism (policy) design itself versus agent behavior or exogenous shocks (economic change).

Policy design *is* mechanism design, so understanding how mechanisms operate within systems of collective action helps policy makers take more purposeful and well thought-out actions. Policy simulations allow decision makers to alter underlying assumptions and mechanisms to assess the consequences of their decisions across long time horizons *in silica* with zero social costs. Thus, a collectively developed simulation can be used to clarify values, make assumptions explicit, and make updates use of the evidence based in program planning, administrative decision-making, and performance evaluation. Thinking about implementation in terms of mechanisms allows researchers to study the interaction of evidence-based practices and contextual variations, and thus trace the roots of policy resistance.

References

Ackoff, R. L. (1994). Systems Thinking and Thinking Systems. *System Dynamics Review, 20*(2-3), 175-188.

Ashby, W. R. (1956). *An introduction to cybernetics.* London: Chapman & Hall.

Beer, S. (1972). *Brain of the Firm: A Development in Management Cybernetics.* New York: Herder & Herder.

Box, G., & Draper, N. (1987). *Empirical Model Building and Response Surfaces.* New York: John Wiley & Sons.

Bunge, M. (2004). How Does It Work? The Search for Explanatory Mechanisms. *Philosophy of the Social Sciences, 34*(2), 182-210.

Churchman, C. W. (1967). Wicked Problems. *Management Science, 14*(4), 141-146.

Cook, J. W., & Tonurist, P. (2016). *From Transactional to Strategic: Systems approaches to public service challenges.* OECD, Observatory of Public Sector Innovation. Paris: OECD.

deLeon, P. (1999). The Missing Link Revisited: Contemporary Implementation . *Policy Studies Review, 16*, 311-339.

Herd, P., DeLeire, T., Harvey, H., & Moynihan, D. (2013). Shifting Administrative Burden to the State: The Case of Medicaid Take-UP. *Public Administration Review, 73*(s1), S60-S81.

Koffka, K. (1935). *Principles of gestalt psychology.* London: Lund Humphries.

Mazmanian, D. A., & Sabatier, P. A. (1983). *Implementation and Public Policy.* Glendale, Il: Scott, Foresman.

Meadows, D. (1982). Whole Earth Models and Systems. *CoEvolution Quarterly*, 98-108.

Miller, J. H., & Page, S. E. (2007). *Complex Adaptive Systems: An Introduction to Computational Models of Social Life.* Princeton: Princeton University Press.

Moynihan, D., Herd, P., & Harvey, H. (2014). Administrative Burden: Learning, Psychological, and Compliance Costs in Citizen-State Interactions. *Journal of Public Administration Research and Theory, 25*(1), 43-69.

Office of the Actuary. (2016). *2016 Actuarial Report on the Financial Outlook for Medicaid.* Centers for Medicare & Medicaid Services. Woodlawn, MD: US Department of Health & Human Services.

O'Toole, L. J. (2000). Research on Policy Implementation: Assessment and Prospects. *Journal of Public Administration Research and Theory, 10*(2), 263-288.

Page, S. E. (2010). *Diversity and Complexity.* Princeton: Princeton University Press.

Rescher, N. (1998). *Complexity: A Philosophical Overview.* London, UK: Transaction Publishers.

Roach, D., & Bednar, D. (1997). The Theory of Logical Types: A Tool for Understanding Levels and Types of Change in Organizations . *Human Relations, 50*(6), 671-699.

Rudowitz, R. (2016, December). *The Kaiser Commission on Medicaid and the Uninsured.* Retrieved March 2017, from Kaiser Family Foundation: http://files.kff.org/attachment/Issue-Brief-Medicaid-Financing-The-Basics

Sandfort, J., & Moulton, S. (2015). *Effective Implementation in Practice: Integrating Public Policy and Management.* San Francisco: Jossey-Bass.

Smith, K. B., & Larimer, C. W. (2009). *The Public Policy Theory Primer.* Boulder, CO: Westview Press.

Sterman, J. D. (2000). *Business Dynamics: Systems thinking and modeling for a complex world.* Boston, MA: Irwin/McGraw-Hill.