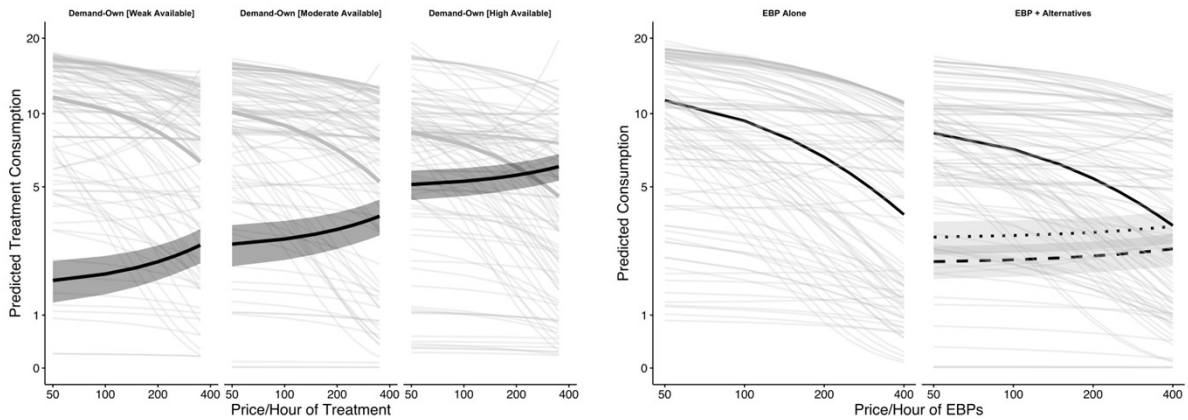


## Recent Advances in Behavioral Economic Approaches to Intervention Choice

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Louisiana State University



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## Background, Training, and Interests

### Background



**Shawn P. Gilroy**

Behavior Analyst  
School Psychologist  
Licensed Psychologist

- Assistant Professor of School Psychology, Louisiana State University
- Applied researcher with a focus on supporting diverse learners presenting with various learning, developmental, and/or behavioral needs (with a focus on autism)
- Free and open-source developer for statistical software, assistive technology, various other technical aids
- Advocate for novel and more robust methods in operant behavioral economics (i.e., demand, delay discounting)



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## Some Goals for Today

### Operant demand, applications to choice behavior

- Using the Operant Demand Framework to better understand caregiver treatment choice
- Touch on Consumer Behavior Analysis, an extension incorporating approaches from marketing

### Factors underpinning treatment-related choice

- Briefly review some of the factors that contribute to caregiver choices
- Review evidence as a factor relevant, but not critical, to treatment choices

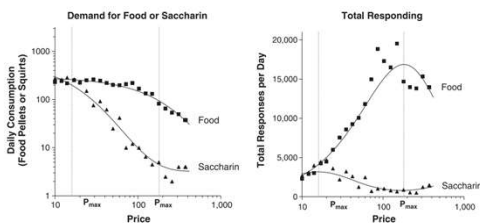
### Guiding and Informing Policy Development

- Experimental Treatment Marketplaces to simulate caregiver intervention choices
- Analyses of data to characterize population-level needs, preferences

long waitlists  
 out-of-pocket costs  
 no anticipatory guidance  
 transportation challenges  
 challenges accessing healthcare  
 limited information following diagnosis  
 limited number of providers  
 limited scheduling options  
 poor insurance coverage  
 delays to diagnosis  
 poor cultural fit

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## The Operant Demand Framework, abridged

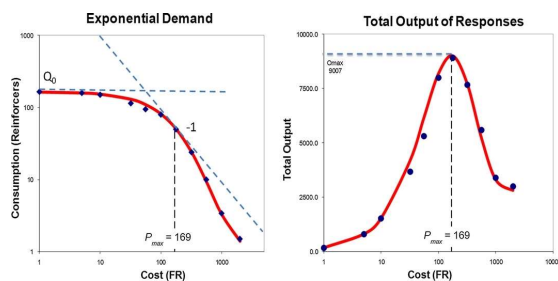


### Operant Behavioral Economics

- Translation of experimental microeconomics
- Evaluates ecological factors and contingencies rather than cognitive biases, heuristics

### Some relevant terms

- Price/Cost: Typically the schedule requirement necessary to produce the reinforcer(s)
- Consumption: The delivery of the reinforcer (immediate consumption of the reinforcer is implied)
- Demand: Degree to which baseline consumption persists despite changes in Price (i.e., low-to-high)
- Work: Responding observed at a Price/Schedule



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## Some Applications of the Operant Demand Framework

### Substance use, effects of drug reinforcers

- Effects of drug reinforcers on behavior (e.g., Naudé et al., 2022; Strickland & Lacy, 2020)
- Informing public policy related to substance use (e.g., Reed et al., 2022)

### Substitutability of reinforcers, harm reduction initiatives

- Substitutability of cigarettes with low nicotine content alternatives (e.g., Heckman et al. 2019)
- Alternatively, exploring complementary effects of drug reinforcers (e.g., Spiga et al., 2005)

### Demand for 'green' and other sustainable practices

- Informing policies related to single-use plastics (e.g., Gelino et al., 2021; Kaplan et al., 2018)
- Demand for carbon-neutral energy purchasing (e.g., Gelino et al., In Press)

### Characterizing schedule effects in interventions

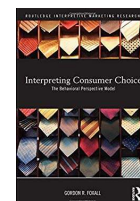
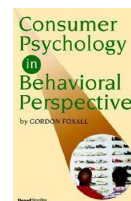
- Characterizing work output across various schedules (e.g., Gilroy et al., 2021, 2019)
- Comparing demand for social and non-social reinforcers (e.g., Kirkman et al., 2022)

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## Some Recent Extensions, Outgrowths of the Operant Demand Framework

### Consumer Behavior Analysis

- Consumption behavior as being reinforced by both *direct* and *indirect contingencies*
- **Utilitarian**: Reinforcer effects derived *directly* from consumption of the reinforcer produced
- **Informational**: Reinforcer effects independent of direct consumption (e.g., how verbal community responds to that consumption)



### Treatment-related Choice

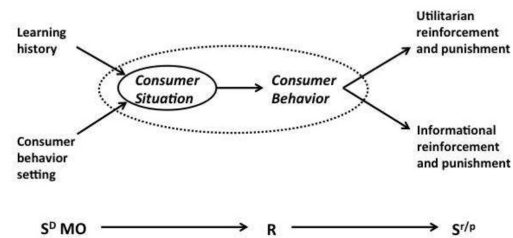
- Preferences and interests related to behavioral and/or mental health treatment services
- Characterize demand for both evidence- and non-evidence-based approaches
- Exploration of how various constraints (e.g., time, out-of-pocket price) influence choices

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## Consumer Behavior Analysis: A Layered View of Reinforcer Effects

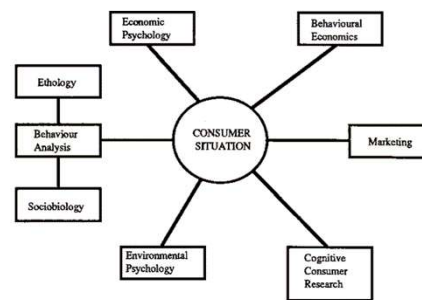
### Utilitarian Reinforcement (UR)

- The layer of reinforcer effects most explored in behavior analytic research
- UR is the result of isolating the reinforcer feedback function in controlled experiments



### Informational Reinforcement (IR)

- A largely unexplored layer of reinforcer effects in behavior analytic research
- Reinforcer effects are *independent* of direct consumption and the result from subsequent interactions with one's verbal community
- Not as easily isolated in controlled experiments, can be either immediate or delayed in their delivery



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## Consumer Behavior Analysis: An Example



OR



### Choice 1: Volvo S60

- **Good Utilitarian Value**
  - Safe form of transportation
  - Reliable and dependable
- **Low-to-Moderate Informational Value**
  - A premium vehicle, signals social standing
  - Associated with safety, reliability
- **High UR** and **Low-to-Moderate IR**

### Choice 2: BMW 3-Series

- **Good Utilitarian Value**
  - Safe form of transportation
  - Reliable and dependable
- **Good Informational Value**
  - Premium vehicle, signals social standing
  - A 'head-turner', conversational piece
  - Associated with financial wealth, success, etc.
- **High UR** and **High IR**

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## Treatment-related Choice, Behavior Science, and Pseudoscience

### Treatment-related choices involve competing contingencies

- Choices (typically) made by multiple adults, involving immediate and delayed contingencies
- Choices vary in availability, cost, scheduling options, travel and access, cultural fit, and other dimensions

### Caregiver preferences, service consumption are complex

- Caregivers of children with various disorders seldom consume one treatment approach/service
- The range of therapies concurrently consumed can be staggering (e.g., up to 8 approaches concurrently, on average, for families with an autistic child; see Goin-Kochel et al., 2007)

### Evidence of efficacy is not predictive of treatment choices

- Restriction diets, supplements, 'alternative' treatments\*, all compete with evidence-based options
- Caregiver consumption may persist despite weak/absent evidence (e.g., facilitated communication)

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## Advocating Early, Effective Therapies to Families

"The research says..."

"The data suggest..."

"A recently study suggested..."

### **As behavior analysts, how do we advocate our approach to families?**

"The \_\_\_\_\_ approach doesn't have as much research."

"Experts in the field have suggested..."

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## Exploring Caregiver Choice using the Operant Demand Framework

### Hypothetical Service Purchase Tasks

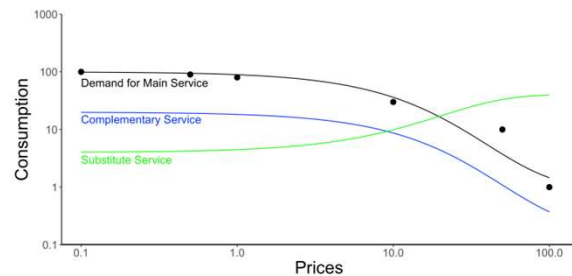
- Simulate caregiver preferences choices under real-world constraints (e.g., budget, time available)
- Hypothetical choices avoid exposing children to unsafe and/or ineffective treatment options (e.g., chelation, hyperbaric oxygen therapy)

"Given a budget of [Money Constraint], how many sessions of [Approach] therapy would you pay for if each session was [Price] dollars?"

"Given a budget of [Time Constraint], how many sessions of [Approach] therapy would you pay for if each session was [Time] hours?"

### Demand Curve Analyses

- Quantify how treatment consumption may be sensitive to ecological factors (e.g., price)
- Evaluate if and how caregivers may substitute certain treatments for others (e.g., evidence-based ones for questionable alternatives)
- Explore *relationships* between treatment options



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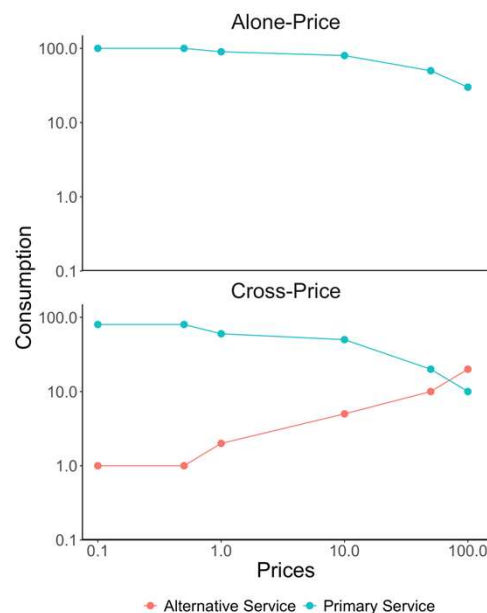
## Methods for Elucidating Consumption Patterns using Operant Demand

### Alone-Price Purchase Tasks

- Caregivers indicate their predicted level of consumption for a *single prospect* in isolation (e.g., PCIT alone)
- Analyses yield several indices related to demand
  - Intensity of demand at Price = 0 ( $Q_0$ )
  - How is that consumption sensitive to price changes?
- Attempts to approximate\* a closed economy

### Cross-Price Purchase Tasks

- Caregivers endorse their predicted levels of consumption *across multiple prospects* (e.g., treatment #1 vs #2)
- Analyses yield indices related to demand and the observed relationship between the choices
  - How do changing constraints affect the relationship?
  - Complement? Substitute? Independent?
- Attempts to approximate\* an open economy



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## Some Early Questions and Findings related to Caregiver Choice

Does scientific evidence explain caregiver treatment choices?

Do differences in evidence strength moderate caregiver treatment choices?

Do caregivers choices differentially track with UR and/or IR contingencies?

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## Study I: Caregivers Generally Substituted EBPs Regardless of Evidence

### Primary Questions

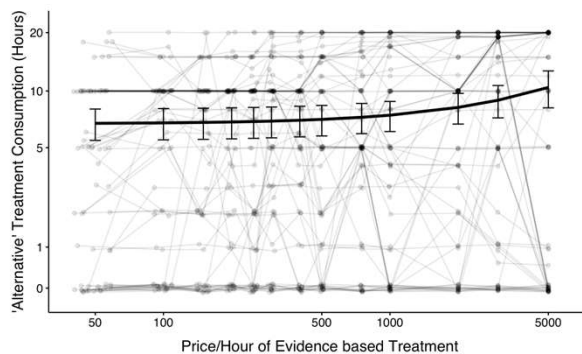
- What is the overall demand for an EBP for caregivers endorsing behavioral challenges?
- Given a discredited approach as an alternative prospect, would this alternative function as a substitute, a complement, or something independent of EBP consumption?

### Findings, Primary Takeaways

- Caregivers almost totally substituted the EBP with the non-EBP (lots of variability though)
- Consumed the non-EBP despite explicit instruction that the approach was disproven
- Takeaway: Evidence is a good thing, but generally not a requirement for caregivers

### Study Methods

- One Alone-Price HPT (PCIT)
- One Cross-Price HPT
  - Primary Service: EBP (PCIT)
  - Alternative Service: Disproven approach based on the "Gentle Touch" therapy



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## Study II: Evidence Levels Moderate Caregiver Treatment Choices

### Primary Questions

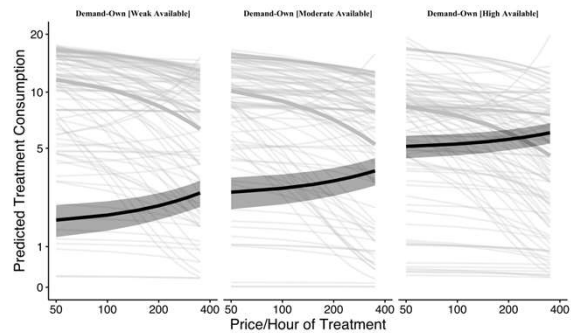
- How do caregivers make choices when alternatives vary in evidence strength?
- Does the strength of evidence (i.e., weak, emerging, strong) moderate the degree of treatment substitutability?

### Study Methods

- One Alone-Price HPT: PCIT
- Three Cross-Price HPTs:
  - EBP vs. Weak Evidence Alternative
  - EBP vs. Emerging Evidence Alternative
  - EBP vs. Strong Evidence Alternative

### Findings, Primary Takeaways

- Caregivers almost totally substituted EBPs, independent of presence/strength of evidence
- Main effect found for levels of evidence on treatment substitutability
- Takeaway: Evidence is a factor, but alone, is not predictive of most treatment choices



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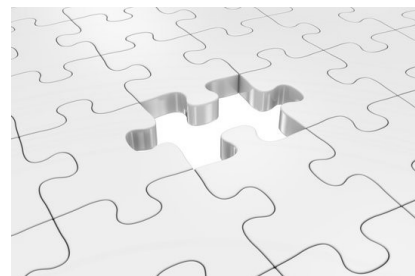
## Characterizing Caregiver Choice using Consumer Behavior Analysis

### A Brief Reflection

- Caregiver choices overall trend towards evidence, but evidence does not account for most choices
- Caregiver choices are complex, likely involve a *combination* of immediate and delayed contingencies

### Caregivers and Informational Contingencies

- Treatment choices take place within a greater cultural system
  - Rooted in local verbal communities (e.g., peers)
  - Communities can differentially respond to treatment choices (e.g., social approval, social disapproval)
- Example: Some systems interpret overt and covert behavioral issues as matters related to faith, rather than health
  - Seeking therapy may be viewed as break from faith
  - May affect social standing, current relationships, etc.



### IR Contingencies: A Missing Piece?

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### Study III: Most Caregiver Maximized Informational Contingencies

#### Primary Questions

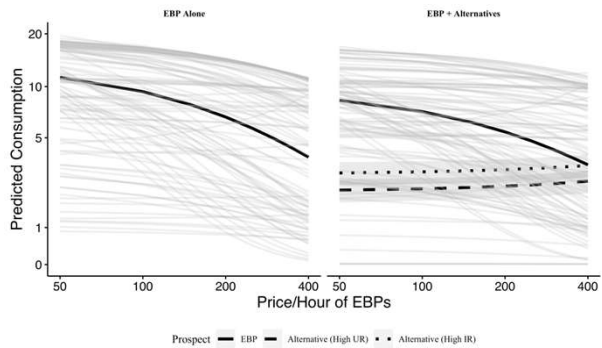
- What is the level of demand for an EBP 'favored' with verbal community (high UR/IR)?
- When unable to maximize for both UR and IR contingencies, would caregivers favor one more than the other?

#### Study Methods

- Alone-Price HPT: High UR/IR (EBP)
- Cross-Price HPT:
  - Primary Service: High UR/IR (EBP)
  - Alternative: High UR/Low IR (EBP)
  - Alternative: Low UR/High IR (non-EBP)

#### Findings, Primary Takeaways

- Demand strongest when UR and IR is high
- IR contingencies accounted for most choices
- Takeaway: Choices tracked more strongly for informational contingencies than for utilitarian contingencies



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### Circling Back: Advocating Early, Effective Therapies to Families

"The research says..."

"The data suggest..."

"A recent study suggested..."

#### As behavior analysts, how do we advocate our approach to families?

"The \_\_\_\_\_ approach doesn't have as much research."

"Experts in the field have suggested..."

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## Translating Consumer Behavior Analysis (CBA) to Policy

### Towards Function-based Policy

- Effective programming begins with understanding the types of contingencies that drive behavior
- Label such as “pseudoscientific consumers” reveal little regarding contingencies that influence choice
- Operant behavioral economic methods can inform function-based policy in this regard

### Experimental Treatment Marketplaces

- Hypothetical Purchase Tasks can be used to index levels of demand, preference for certain approaches
- State-level initiatives can be informed by the contingencies and subgroups identified in analyses

### **Behavioral Economic Demand: How Simulated Behavioral Tasks Can Inform Health Policy**

Derek D Reed<sup>1,2</sup>, Brett W Gelino<sup>3</sup>, and Justin C Strickland<sup>3</sup>

### **Progress of and Prospects for Hypothetical Purchase Task Questionnaires in Consumer Behavior Analysis and Public Policy**

Peter G. Roma<sup>1,2</sup> · Derek D. Reed<sup>3</sup> ·  
Florence D. DiGennaro Reed<sup>3</sup> · Steven R. Hursh<sup>1,2</sup>

*BEHAVIORAL ECONOMICS AND EMPIRICAL PUBLIC POLICY*

STEVEN R. HURSH AND PETER G. ROMA

INSTITUTES FOR BEHAVIOR RESOURCES  
AND

DEPARTMENT OF PSYCHIATRY AND BEHAVIORAL SCIENCES, JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

*FROM DEMAND CURVES TO PUBLIC POLICY: INTRODUCTION TO THE SPECIAL  
ISSUE ON BEHAVIORAL ECONOMICS*

TIMOTHY D. HACKENBERG

REED COLLEGE

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## A Proposed Protocol: Louisiana Department of Health/Medicaid

### Autistic Medicaid Recipients at the Highest Risk for Negative Outcomes

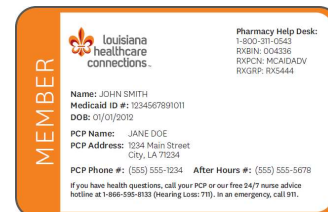
- Higher risk of negative health, social, and behavioral outcomes (compared to non-Medicaid controls)
- This subset of the autistic population historically has lower/delay consumption of EBPs

### Previous Policies Minimally Effective

- Efforts largely related to anticipatory guidance, disseminating information regarding evidence
- Consumption of ‘fad’, pseudoscientific, or otherwise low value practices remains high

### Plan: Characterize Choice using CBA

- Construct HPTs, design constraints relevant to families eligible for Medicaid in Louisiana
- Identify contingencies to inform public initiatives



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## New Methods for New Questions in Operant Demand

### Families preferences are not monolithic

- Informational contingences emerge from verbal communities, distinct communities should exist
- Data-driven approaches can identify classes, clusters of consumers in the population

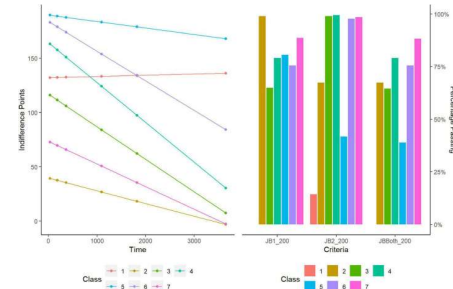
### Latent Class Mixed Effects Modeling

- Latent classes reflect 'clusters' endorsing similar preferences, demand for behavior therapies
- Mixed effects modeling retains individual-level variance for individual inspection (e.g., membership)
- Function-based recommendations can be provided:
  - Where to emphasize delivering support?
  - What types of contingencies to target?

### Beyond Systematic and Unsystematic Responding: Latent Class Mixture Models to Characterize Response Patterns in Discounting Research

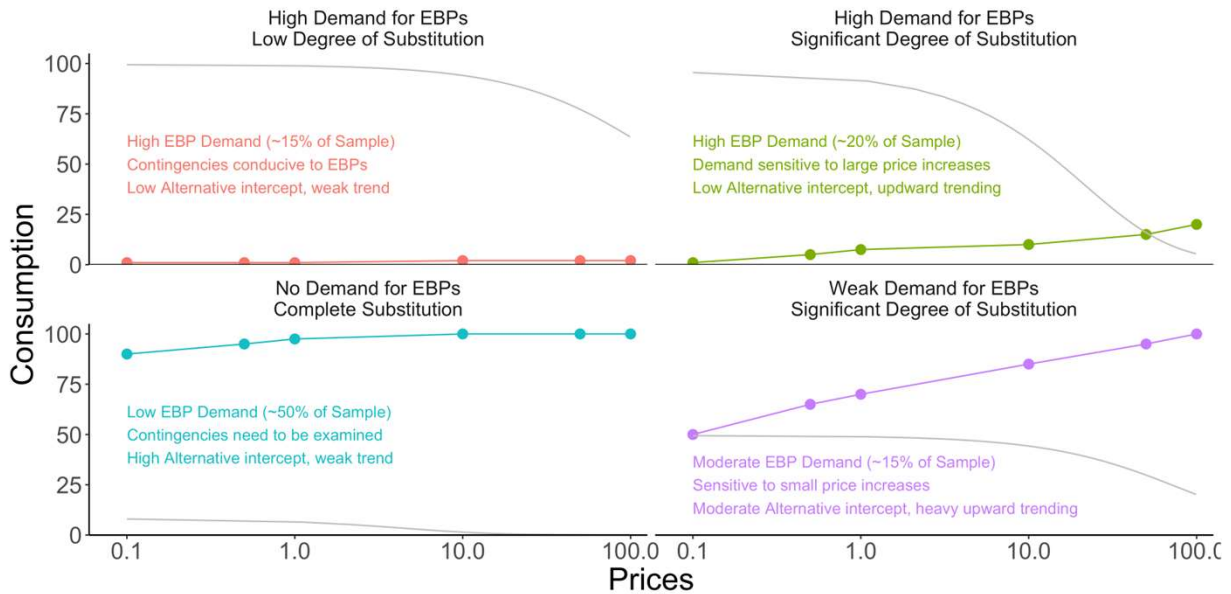
Shawn P. Gilroy<sup>1\*</sup>, Justin C. Strickland<sup>2</sup>, Gideon P. Naudé<sup>2</sup>, Matthew W. Johnson<sup>2</sup>, Michael Amlung<sup>3,4</sup> and Derek D. Reed<sup>1,4</sup>

<sup>1</sup> Department of Psychology, Louisiana State University, Baton Rouge, LA, United States; <sup>2</sup> Behavioral Pharmacology Research Unit, Department of Psychiatry and Behavioral Sciences, Johns Hopkins University, Baltimore, MD, United States; <sup>3</sup> Department of Applied Behavioral Science, University of Kansas, Lawrence, KS, United States; <sup>4</sup> Coffin Logan Center for Addiction Research and Treatment, University of Kansas, Lawrence, KS, United States



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## Some Potential 'Clusters' of Decision-Makers



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## Some Concluding Thoughts, Reflections on Advocating for EBPs

### Complex choice situations

- Guidelines for developing function-based treatment are clear, supporting families in applying those strategies is more complex
- Treatment adoption/maintenance linked to direct and indirect caregiver contingencies
- Efficacy, evidence alone is not enough

### Informational Reinforcement

- Families are active participants in treatment
- Contingencies relevant to caregiver behavior are as critical as those to client behavior
- Behavior analysts should explore more community-based action and advocacy

JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1978, 11, 203-214 NUMBER 2 (SUMMER 1978)  
 SOCIAL VALIDITY: THE CASE FOR SUBJECTIVE MEASUREMENT  
 OF  
 HOW APPLIED BEHAVIOR ANALYSIS IS FINDING ITS HEART<sup>1</sup>  
 MONTROSE M. WOLF  
 UNIVERSITY OF KANSAS

### Dimensions of Social Validity

- Per Wolf (1978):
  - Significance of the goals of treatment
  - Appropriateness of the treatment procedures
  - Social importance of the effects of treatment
- Do we need to broaden our view? From social validity to cultural validity?

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## Contact Information

### Addresses, Repositories, Relevant Info:

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- OrCID: <https://orcid.org/0000-0002-1097-8366>
- ResearchGate: [https://www.researchgate.net/profile/Shawn\\_Gilroy](https://www.researchgate.net/profile/Shawn_Gilroy)



Presentation shared on RG (PDF) and GitHub (PDF/Code)



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