The Intersection of Applied Behavior Analysis and Behavioral Pharmacology

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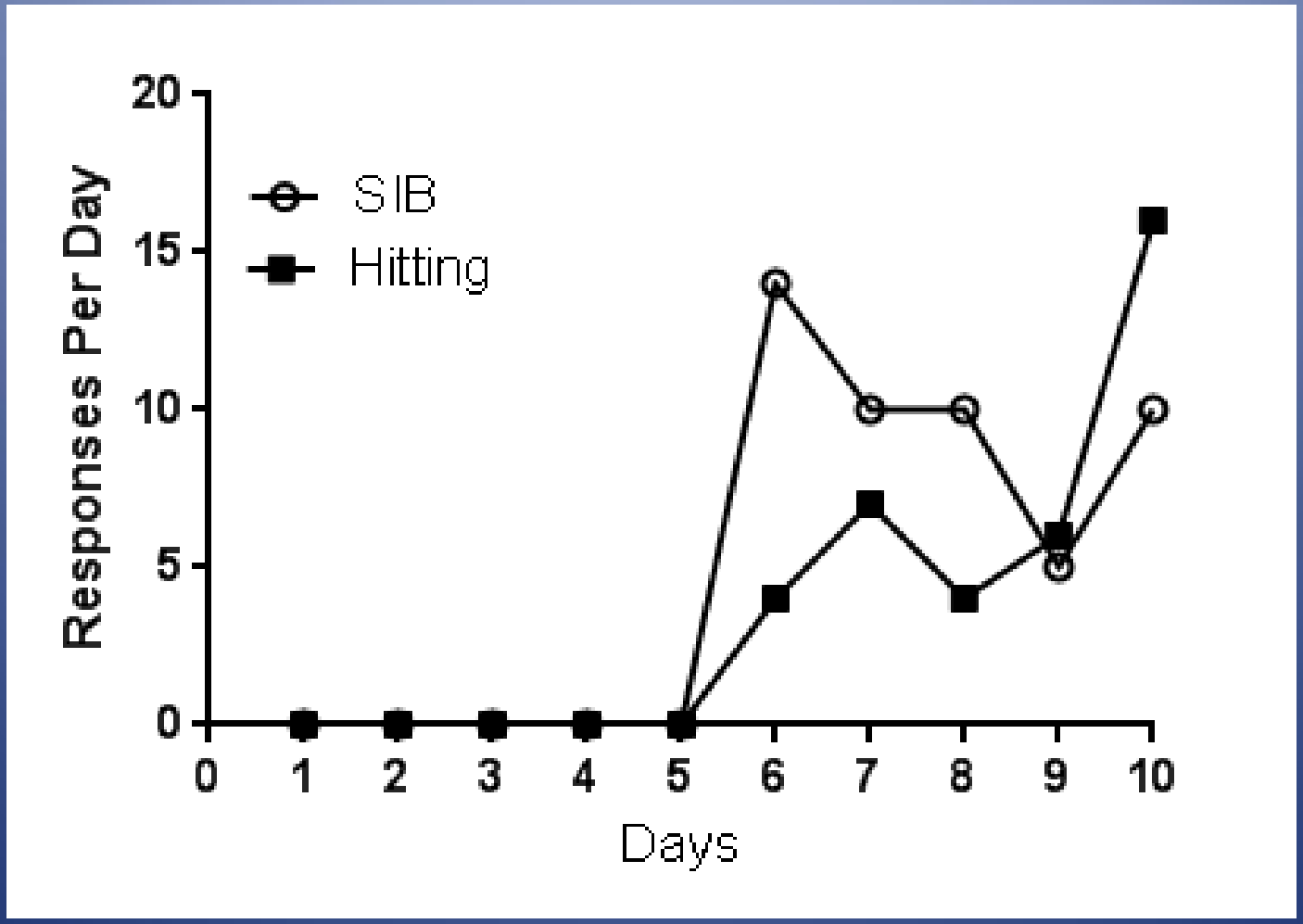
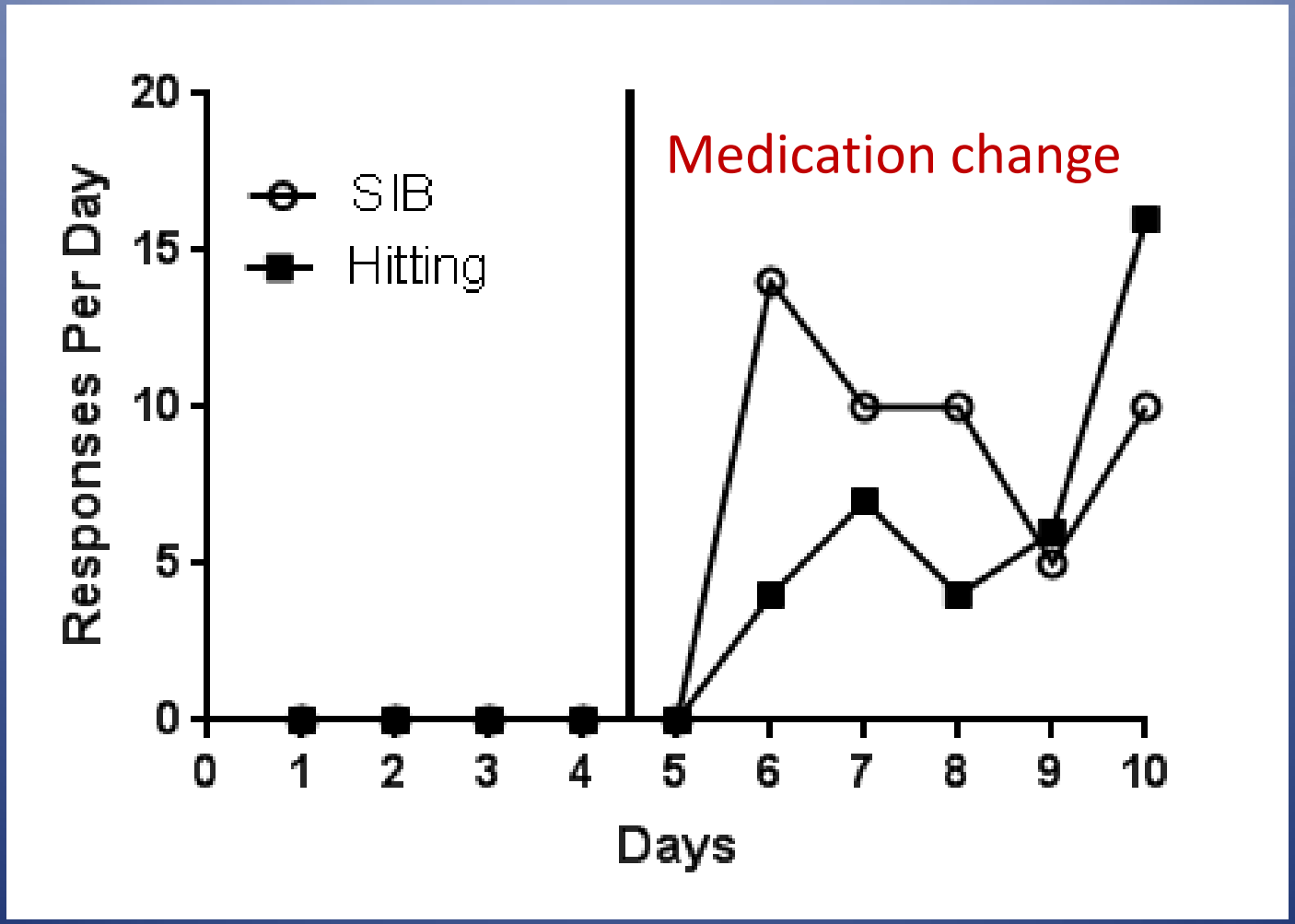
MCLA


Responses Per Day
20
15
10
5
0
SIB
Hitting
0
1
2
3
4
5
6
7
8
9
10
Days


Medication change
SIB
Hitting
Responses Per Day
20
15
10
5
0
0
1
2
3
4
5
6
7
8
9
10
Days

“Drug use is so entrenched in our society that anyone interested in human behavior must consider its influence.”

(Higgins, Hughes, & Gallager, 1987)

We practice the science of behavior change.

- Drugs can have profound effects on behavior.
- Behavior analysts may not receive specific training in the behavioral effects of drugs.
- Some of your clients are/will be prescribed psychoactive drugs.
- Estimates of the percentage of children diagnosed with autism and receiving pharmacotherapy range from 30 to 42 percent (Sullivan and Sadeh, 2014)
- Estimates of the percentage of children diagnosed with ADHD and receiving pharmacotherapy fall between 40 and 69 percent. (CDC, 2011)

Two assertions

- It would be beneficial for behavior analysts to be conversant regarding those psychoactive medications we encounter frequently.
- Our training and methodology places us in a good position to evaluate drug effects.

The FDA has approved two drugs for autism treatment

- Risperidone (Risperdal)
- Aripiprozole (Abilify)
- Both are atypical or second-generation antipsychotics
- Behavior analysts may be unfamiliar and perhaps, surprised, with the research methodology used in clinical drug trials.

Risperidone in Children with Autism and Serious Behavioral Problems

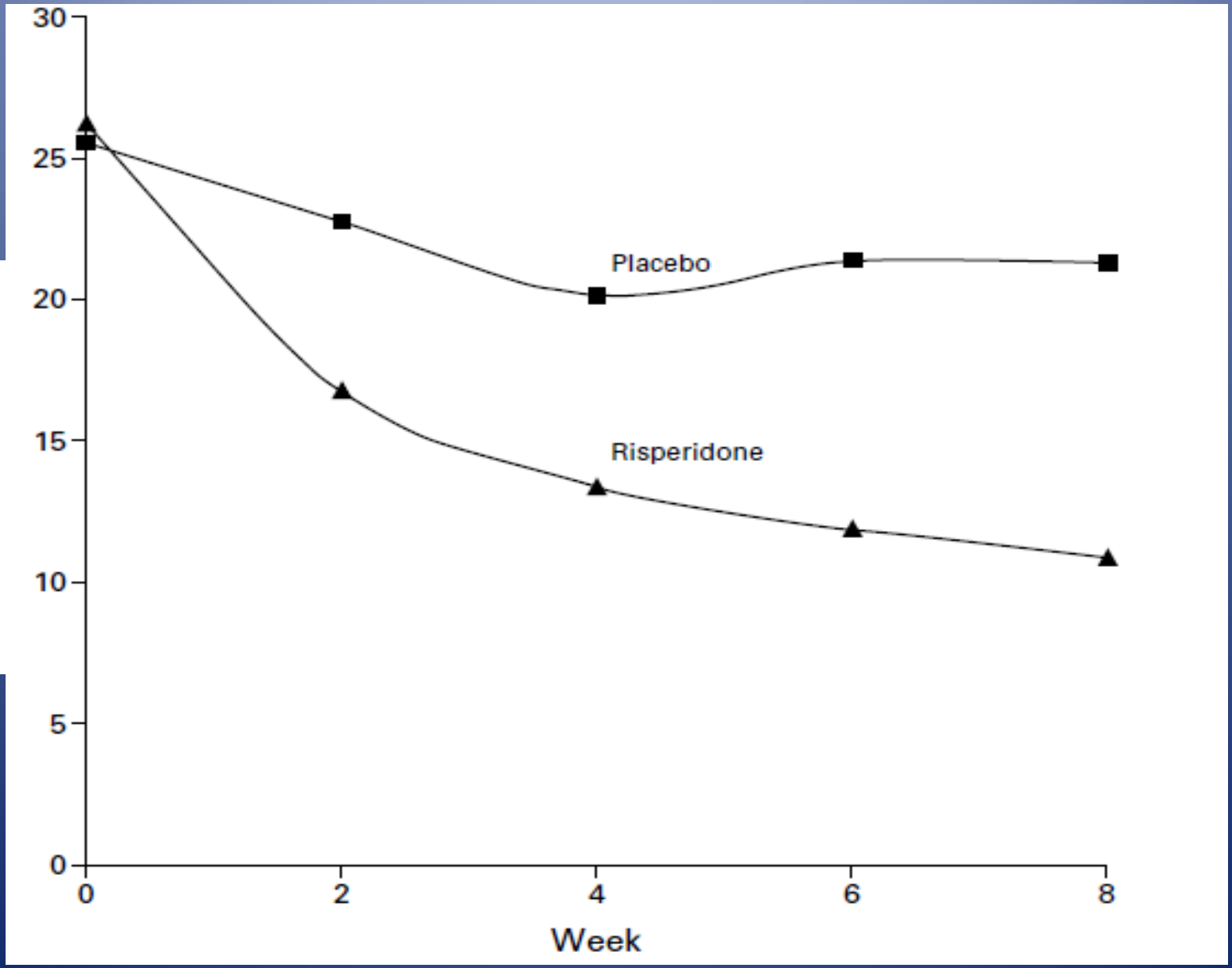
- New England Journal of Medicine (2002)
- James T. McCracken, James McGough, Bhavik Shah, Pegeen Cronin, Daniel Hong, Michael G. Aman, L. Eugene Arnold, Ronald Lindsay, Patricia Nash, Jill Hollway, Christopher J. McDougle, David Posey, Naomi Swiezy, Arlene Kohn, Lawrence Scahill, Andres Martin, Kathleen Koenig, Fred Volkmar, Deirdre Carroll, Allison Lancor, Elaine Tierney, Jaswinder Ghuman, Nilda M. Gonzalez, Marco Grados, Benedetto Vitiello, Louise Ritz, Mark Davies, James Robinson, and Don McMahon, M.S.

From the Abstract

Conclusions

"Risperidone was effective and well tolerated for the treatment of tantrums, aggression, or self-injurious behavior in children with autistic disorder. The short period of this trial limits inferences about adverse effects such as tardive dyskinesia. (p. 315)"

Data


Mean Irritability Score
30
25
20
15
10
5
0
0
2
4
6
8
Week
Placebo
Risperidone

Irritability?

- Tantrums, aggression, and self-injurious behavior were viewed in a topographical rather than a functional context.
- IMHO, they were treated more like an infection.
- Behavior was not measured directly.

ABC’s were used

Antecedent Behavior Consequence?

No

Aberrant Behavior Checklist

Aberrant Behavior Checklist

- ABC includes an “Irritability” subscale
- “Please rate the child’s behavior according to the scale below:

  0 = behavior is not a problem

  1 = The behavior is a slight problem

  2 = The behavior is a moderate problem

  3 = The behavior is a severe problem

ABC continued

- Self injury
- Tantrums
- Crying and screaming
- “Irritable and Whiny”

Fast and easy

Side Effects
($p < .05$)

- Increased appetite
- Fatigue
- Drowsiness
- Drooling
- Weight gain (mean of 2.7 kg in 8 weeks)

A note regarding placebo control

Influence: Cited over 500 times

- Impact Factor:

The NEW ENGLAND JOURNAL of MEDICINE

54.42

Journal of Applied Behavior Analysis

1.087

A Placebo-Controlled, Fixed-Dose Study of Aripiprazole in Children and Adolescents With Irritability Associated With Autistic Disorder

Journal of the American Academy of Child and Adolescent Psychiatry (2009)

(I will list the authors later)

Again, from the abstract

"Aripiprazole was efficacious and generally safe and well tolerated in the treatment of children and adolescents with irritability associated with autistic disorder."

Main DV?

"At week 8, all aripiprazole doses produced significantly greater improvement than placebo in mean Aberrant Behavior Checklist Irritability subscale scores"

Authors and Affiliations

Author	Affiliation
R.N. Marcus	Bristol-Myers Squibb
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R.D. McQuade	Otsuka Pharmaceutical Co
W.H. Carson	Otsuka Pharmaceutical Co
M. Aman	Ohio State University

A metaphor: intervention for reducing automobile accidents

Prior to designing intervention, we should examine why accidents happen:

Driver impairment (drugs, sleep, texting)

Weather (ice, glare)

Mechanical failure (faulty brakes, blowouts)

Driver experience

Animal crossings

Never mind!

- Too much trouble! Let's just lump it all together and call it . . .
- Crashability
- Intervention will involve setting speed governors at 10 mph.
- Data: Let's not bother with actually counting accidents.

UCLC (Unusual Car Condition Checklist)

- Please rate your car's condition for the past four weeks. For each item assign the appropriate number:
  - 0 = Not a problem
  - 1 = A little problem
  - 2 = A moderate problem
  - 3 = A severe problem

Crashability Subscale

- Seek frequent contact with large objects.
- Accelerate at inappropriate times
- Unresponsive to pedestrians
- Make lane changes quickly and unpredictably

Some Historical Notes

- Johnson & Johnson Ordered to Pay More Than $2.2 Billion to Resolve Criminal and Civil Investigations (Department of Justice, 2013)
- Note that J&J sold $4.5 billion of Risperidone in 2007 alone
- Current lawsuits (hundreds) regarding gynacomastia. One recent settlement involved a young man who developed size 44DD breasts.

When it comes to assessing drug effects, you can do better

- As behavior analysts, we are in a good place to a) measure behavior, b) evaluate treatment efficacy and c) identify stimulus function.
- With some study, these skills can be applied to investigating drug effects.

Behavioral Pharmacology

- Essentially a merger of behavior analysis and pharmacology
- If you have formal training in behavior analysis, you already understand much of the approach

Stimulus Functions of Drugs

A	B	C
discriminative stimuli motivational operations unconditioned stimuli conditioned stimuli		reinforcers punishers

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Drugs as Motivational Operations

- A drug functions as a motivational operation if it alters the reinforcing efficacy of other stimuli.

Methylphenidate increases cigarette smoking in participants with ADHD.

- *Psychopharmacology* (2011)
- Vansickel, A.R., Stoops, W.W., Glaser, P.E.A., Poole, M.M., & Rush, C.R.

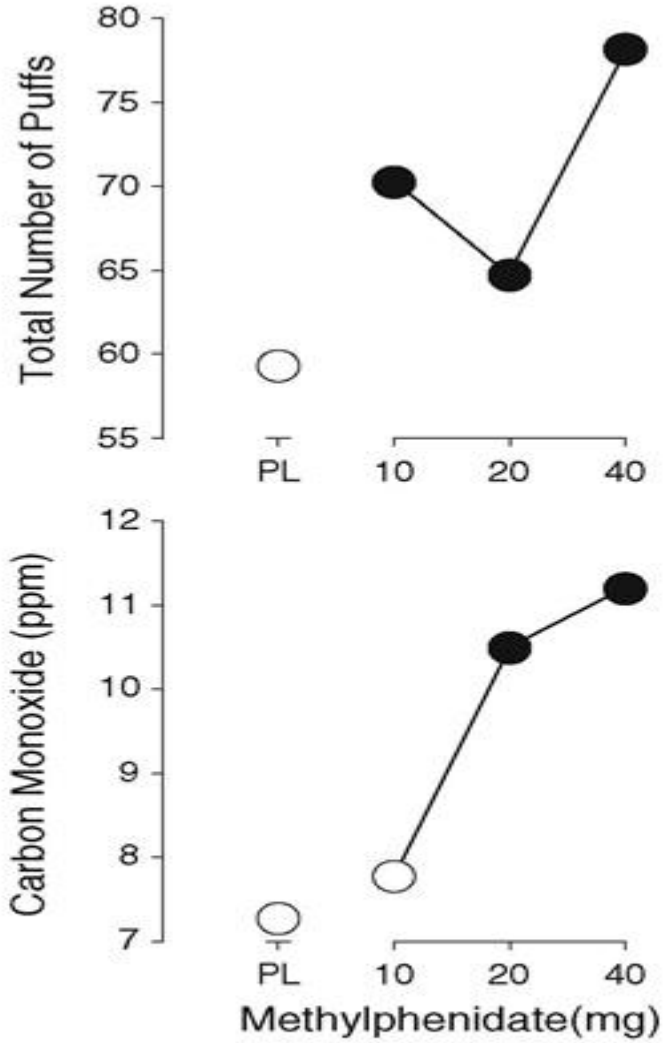


Fig. 1 Dose–response functions for total number of puffs (*top panel*) and carbon monoxide levels (*bottom panel*). *X-axes* methylphenidate dose in milligrams; data points above *PL* designate placebo values. Data points show the means of nine participants. *Filled symbols* indicate those values that are significantly different from the placebo value

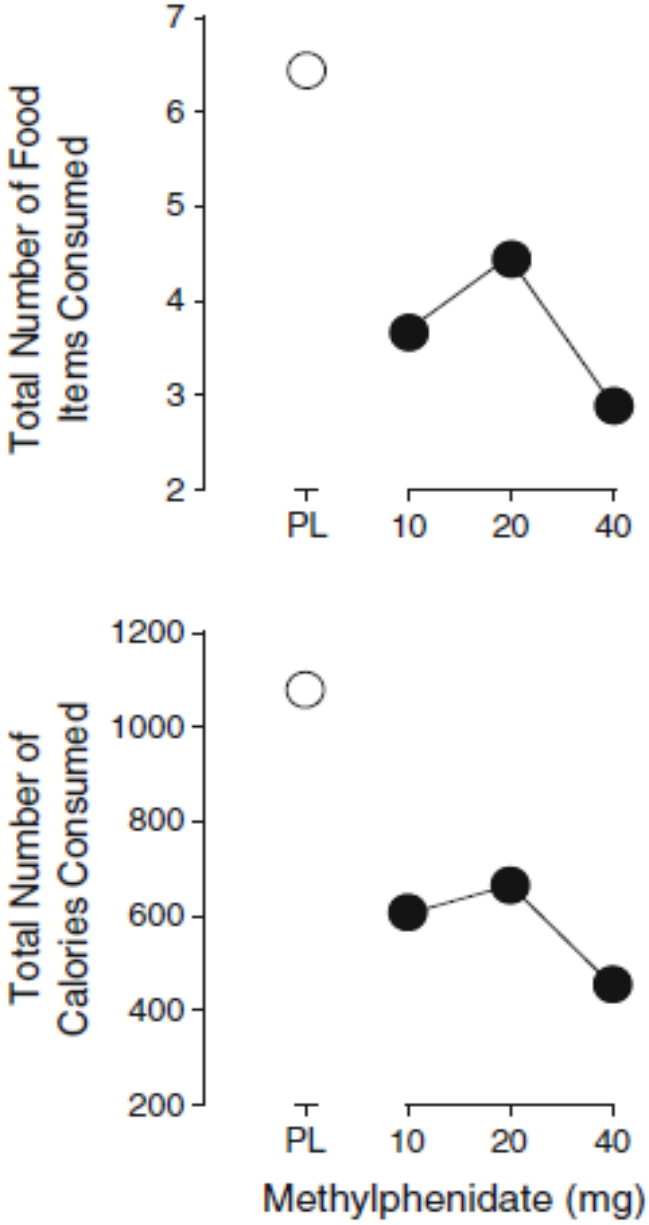
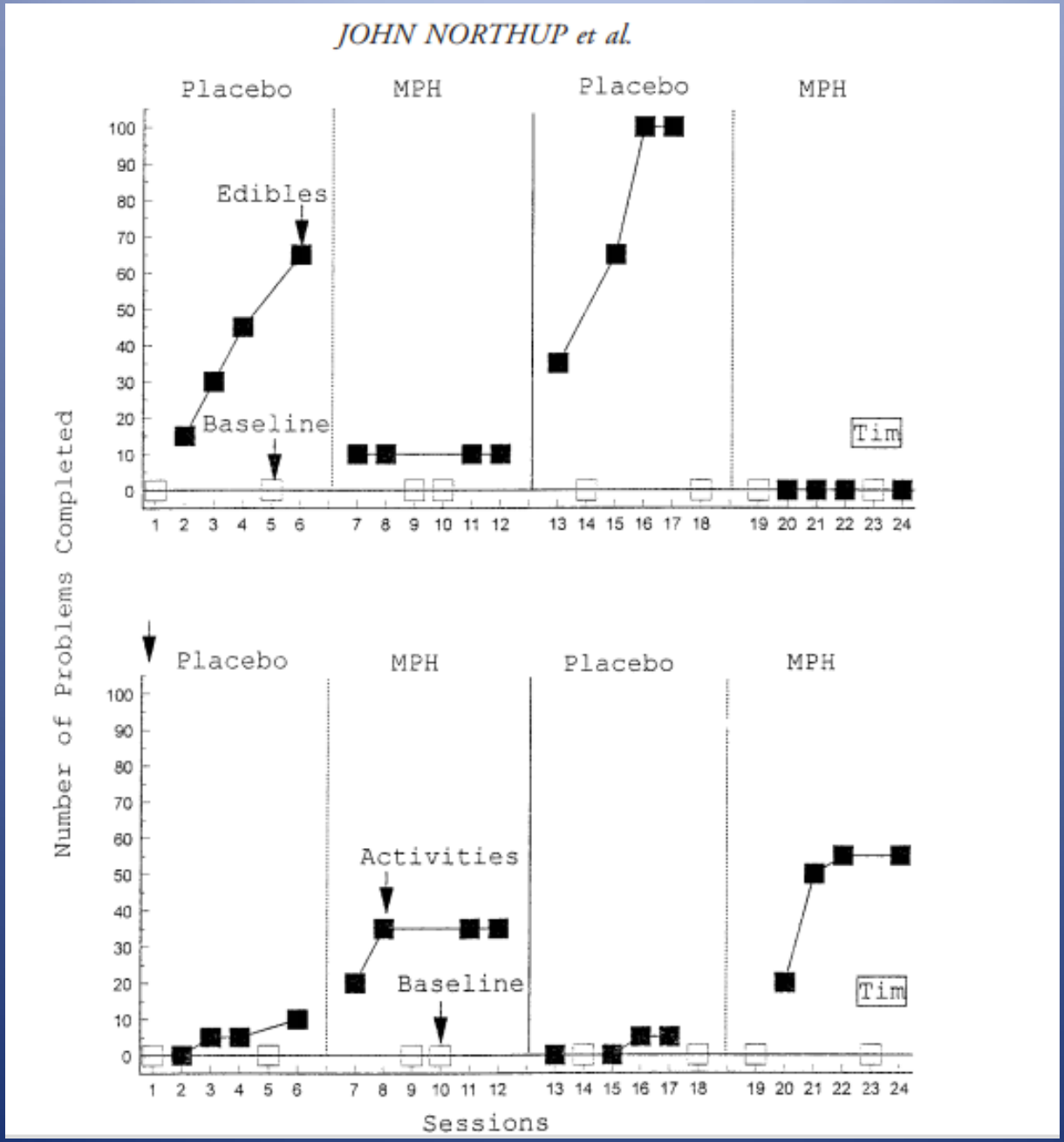


Fig. 2 Dose–response functions for number of food items (*top panel*) and calories consumed (*bottom panel*). All other details are the same as for Fig. 1

An Evaluation of Methylphenidate as a Potential Establishing Operation for Some Common Classroom Reinforcers

Journal of Applied Behavior Analysis (1998)

Northup, J., Fusilier, I. Swanson,V., Roane, H., and Borrero, J.


JOHN NORTHUP et al.
Placebo
MPH
Placebo
MPH
Edibles
Baseline
Tim
Placebo
MPH
Placebo
MPH
Activities
Baseline
Tim
Number of Problems Completed
Sessions

Use of Functional Analysis Methodology in the Evaluation of Medication Effects

Journal of Autism and Developmental Disorders (2003)

Crosland, K.A, Zarcone, J.R., Lindauer, S.E., Valdovinos, M.G., Zarcone, T.J., Hellings, J.A., & Schroder, S.R.

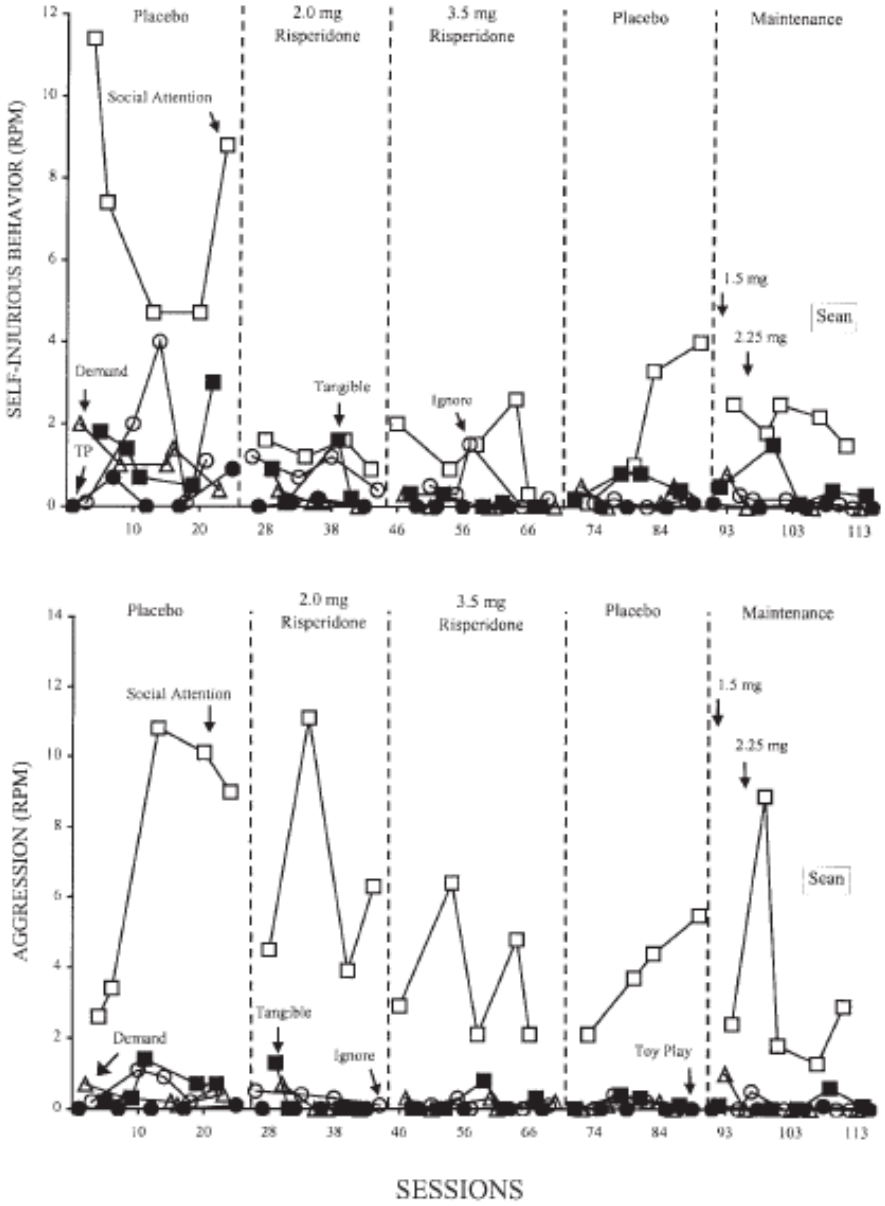
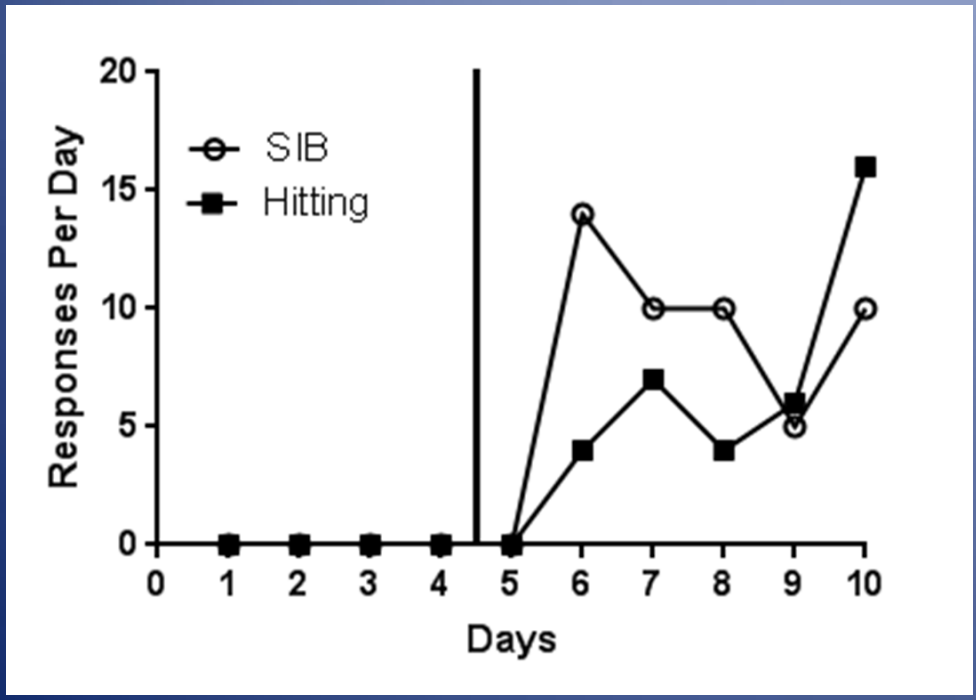


Fig. 2. Responses per minute of self-injury and aggression during all phases of the functional analysis for Sean.

Back where we started

Could medication change cause an increase in maladaptive behavior?



- AO: Reduce reinforcing efficacy of contrived reinforcers.
- MO: Increase reinforcing efficacy of food/attention
- MO: increase value of escaping from demands

Resources

Van Haaren, F., & Weeded, M. (2013). Some guidelines for conducting research in applied behavioral pharmacology. *Journal of Applied Behavior Analysis, 46*, 498-506.

Julien, R.M., Advokat C.D., & Comaty, J.E. (2010). *A primer of drug action*, New York, Worth.

Resources Continued

Schaal, D.W., & Hackenberg (1994) Toward a functional analysis of drug treatment for behavior problems of people with developmental disabilities, *American Journal on Mental Retardation, 99,* 123-140

References available upon request

Thank you