

*survey engine*

decision modelling technology 

# DCE & Data Collection Seminar

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University of Vermont

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# Today's Talk: What You'll get out of it

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- What is a DCE?
- Audience participation - A toy DCE and models in 5 minutes
- Considerations in a formal DCE study
- Practical applications of DCEs
- Realities of DCE design and sampling
- DCEs uncover fraud!
- Where DCEs and data are going
- A chance to ask questions

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# What is a Discrete Choice Experiment?

# Stated vs. Revealed Preference

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...Or what people say they'll do vs. what they actually do

- 'Would you buy this watch?'
- Sales Data for watches

# Stated Preference DCE's:

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- A **prospective data collection method** for when there's little or no data
- Data is collected via a **controlled choice experiment**
- Choices are presented in a **natural context**
- Data is **well behaved** and easily modelled
- Model coefficients can be interpreted as **Utilities**
- Utilities can be converted into **useful quantities**  
=>Probability, WTP, QALYS etc

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Lets do one now!  
**[surveyengine.com/vermont](https://surveyengine.com/vermont)**

# 'Toy' DCE: Obvious problems and limitations

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- Small Biased Sample
- No authentication
- No 'stay at home' option
- No covariate capture
- Not really quality checked
- Typos (probably)

# 'Toy' DCE: ... not so obvious

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No testing or client review

No self validity tests e.g. dominant scenarios and consistency tests

No IRB or Ethics approval, no informed consent, GDPR compliance, Privacy etc

CCCC Framework absent

- **Convergent Validity** (do results match/converge with similar studies)
- **Construct Validity** (does it match behavioural theory)
- **Content Validity** (is it comprehensible and incentive compatible)
- **Criterion Validity** (is there a good proxy measure of preference to compare with)



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# Toy DCE Version 2.0

# Can DCEs answer ...

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What is Cultural Heritage worth?

How do you value Quality of Life?

Can we balance the needs of dog lovers and dog sceptics in public places?

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# Real World Applications of DCEs

# DCE Projects: Heritage Valuation

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Government Department of Environment, Land, Water and Planning, Victoria

Development of the methodology for valuation of heritage assets in Victoria, Australia.

The objective was to determine the value of heritage assets, to support the valuation method with data and methodology and to communicate this in a manner suited to non-economists.



# DCE Projects: Drone Regulation

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Institute of Transport & Logistics Studies, Sydney

1000 Regular Drone users in Australia recruited to an online DCE.

Data used to model Drone-user's preference and or resistance to proposed regulations.

Models would be used to establish evidence-based policies for drone usage when considering the trade-offs of privacy, safety and security with right to recreation.



# DCE Projects: Future Mobility

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## German Government

An online DCE conducted on 10,500 Berlin residents to model the preference for various configurations of driverless cars, electric vehicles and autonomous ride-sharing with cycling and walking.

The objective was to model the likely mix of transport modes for transport and policy planning in Berlin.

Preliminary models showed rational behavioural choices in hypothetical future scenarios.



# DCE: Application Walk Through

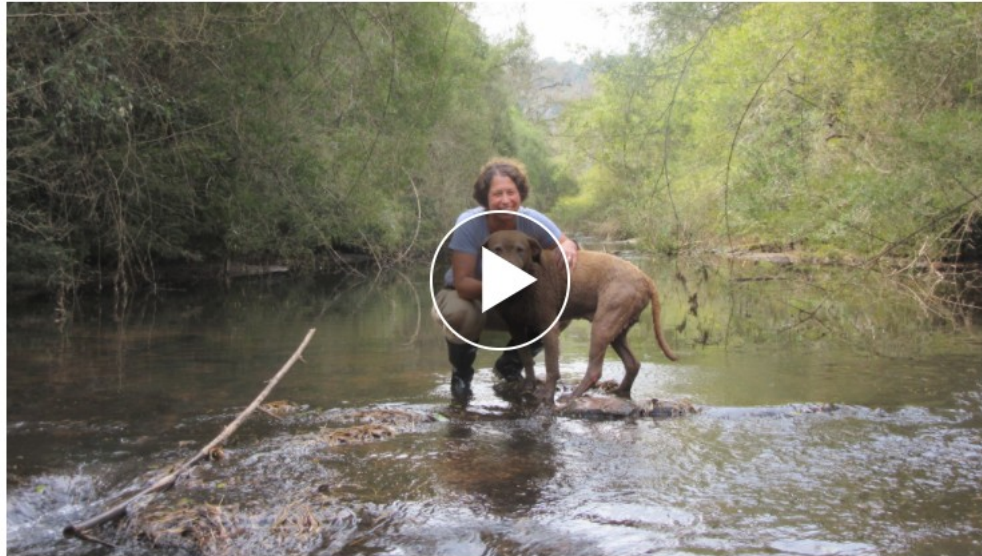
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■ FOR SUBSCRIBERS

**'Needs to stop': Dog poop concerns rile Vermont communities, spark creative clean-up efforts**

**ELIZABETH MURRAY** | Burlington Free Press

2 hours ago



**Dog changing world one poop sample at a time**

This retriever has an incredibly important job and it revolves entirely around poop.

ANIMALKIND, USA TODAY

# Mapping the Problem to a DCE

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## **Attributes (note independence)**

On Leash

Allowed Public spaces

Fines for non-compliance

Tax



# Mapping the Problem to a DCE

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## Attributes with Levels

### On Leash

- Always
- Never
- Depending on area

### Allowed Public spaces

- Parks
- Buses
- At work
- Shopping centres

### Fines for non-compliance

- \$0 - \$100

### Tax

- \$0 - \$200 per year



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# Realities of DCEs and Data

# Realities #1: DCE Practicalities

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Consider the '**opt out**'

Experiment Designs **not as critical** as once thought

Consider **omitted variable** bias

Comprehension and **Realism**

Treatment Sampling with **Stratification**

Plan around the '**value**' of the sample

# Realities #2: Sampling Considerations

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Unrealistic **Feasibility** can kill a project

Privacy vs **Necessity**

Managing **Incidence Rates**

Measuring **Engagement**

Mitigating **Fraud**

## Realities #3: Dealing with Clients

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Have their **own ideas** and **goals**  
**Good Relationships** are critical  
**Expectations** must be **managed**  
Communication should be **appropriate**  
**Education** may be necessary  
Resolve problems **Together**

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An investigation into DCE

**FRAUD!**

# Exhibit A: A Garbage DCE

x1	Time until the cancer spreads	utility	error	Wald	Notes
	20 months -44 months	-0.071	±0.119	0.55	not significant
	20 months -56 months	0.133	±0.118	0.259	not significant
	20 months - 64 months	-0.034	±0.146	0.815	not significant
	36 months-44 months	0.059	±0.134	0.658	not significant
	36 months-56 months	-0.13	±0.132	0.325	not significant
	36 months-64 months	-0.147	±0.120	0.223	not significant
	40 months-44 months	0.052	±0.123	0.672	not significant
	40 months-56 months	0.042	±0.128	0.745	not significant
	40 months-64 months	0.096	±0.128	0.453	not significant
x2	Time until you need chemotherapy	utility	error	Wald	
	44 months	0	±0.000	0	not significant
	56 months	0	±0.000	0	not significant
	64 months	0	±0.000	0	not significant
x3	Risk of seizures because of the additional medicine	utility	error	Wald	
	None (0%)	-0.085	±0.050	0.09	nonsensical rank
	1 person out of 100 (1%)	0.089	±0.058	0.124	nonsensical rank
	3 people out of 100 (3%)	-0.004	±0.054	0.939	nonsensical rank
x4	Skin rash because of the additional medicine	utility	error	Wald	
	None	-0.031	±0.049	0.524	not significant
	Spread over 10% of the body (not the face and not noticeable to others)	0.005	±0.054	0.926	not significant
	Spread over 30% of the body (not the face but noticeable to others)	0.026	±0.052	0.611	not significant
x5	Fatigue while taking the additional medicine	utility	error	Wald	
	No additional fatigue or tiredness	0.017	±0.048	0.723	not significant
	Mild additional fatigue or tiredness	-0.003	±0.052	0.949	not significant
	Severe additional fatigue or tiredness	-0.014	±0.050	0.783	not significant
x6	Trouble thinking clearly while taking the additional medicine	utility	error	Wald	
	None	-0.011	±0.050	0.833	not significant
	Mild trouble thinking clearly	-0.012	±0.054	0.829	not significant
	Severe trouble thinking clearly	0.022	±0.052	0.669	not significant
x7	Dizziness while taking the additional medicine	utility	error	Wald	
	None	0	±0.051	0.993	not significant
	Mild dizziness	0.043	±0.051	0.403	not significant
	Severe dizziness	-0.043	±0.051	0.397	not significant
x8	Falls because of the additional medicine	utility	error	Wald	
	Yes	0.316	±0.032	0	nonsensical rank
	No	-0.316	±0.032	0	nonsensical rank
alt_const	Alternative specific constant	utility	error	Wald	
	ADT Treatment AND Additional Medicine A	0.447	±0.051	0	significant
	ADT Treatment AND Additional Medicine B	0.559	±0.049	0	significant
	ADT Treatment Only No Additional Medicine	-1.007	±0.050	0	significant

Table 2. DCE MNL Model (N = 118. P-value = 0).

- Very few significant estimates
- No face validity
- Nonsensical rank ordering
- Majority of the variation in the alternatives

DCE are resilient to ad hoc fraud and good at picking up 'non-behaviour' behaviour.

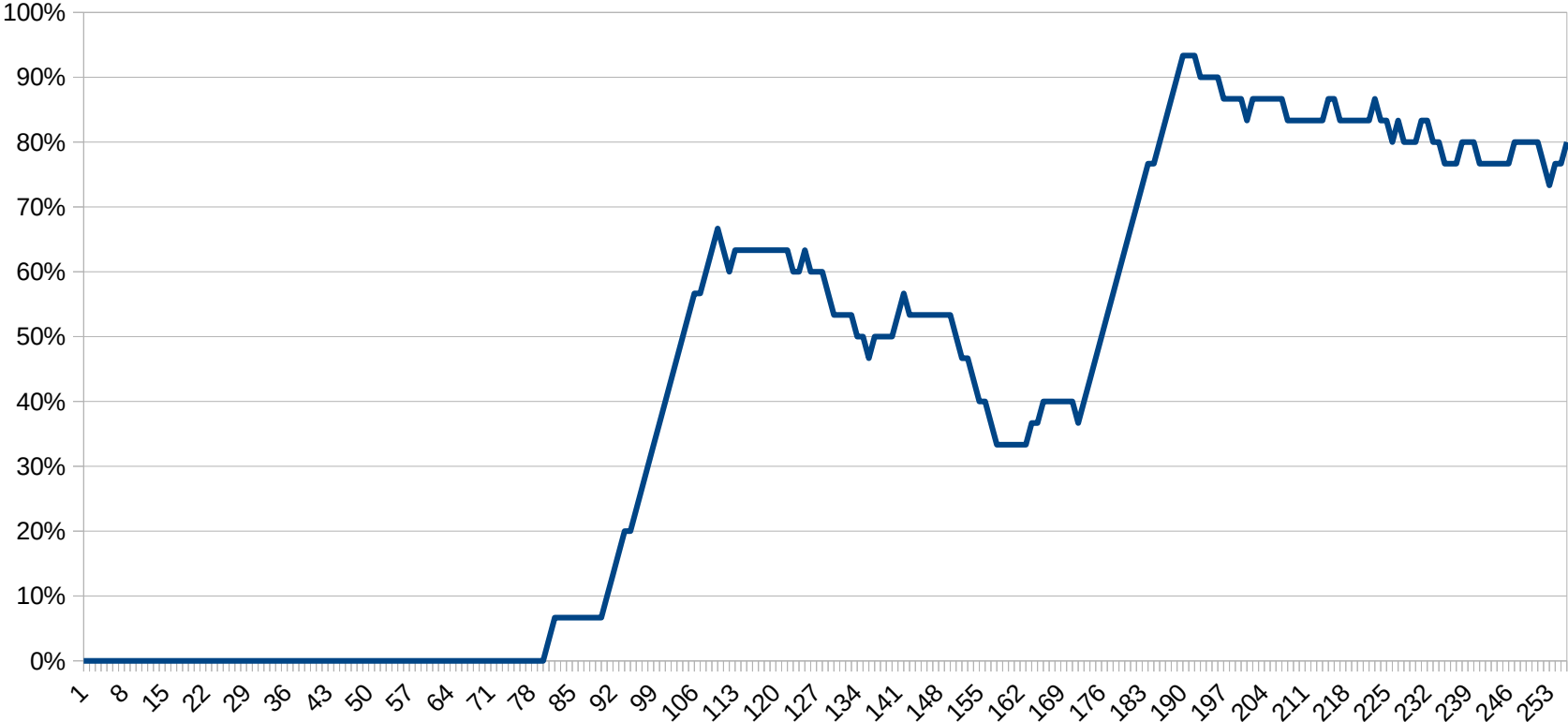
In this case 80% to 100% of the sample was systematic fraud.

Further investigation using standard methods was done.

# Exhibit B: Increasing Eligibility

Time Dependent Completion Rates

rolling 30 respondent average

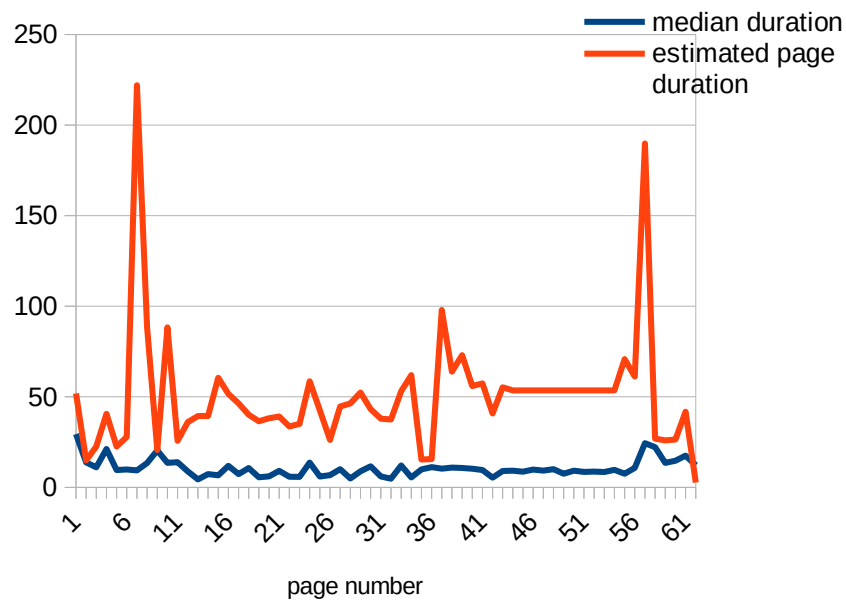




# Exhibit C: No Correlation to Word Count

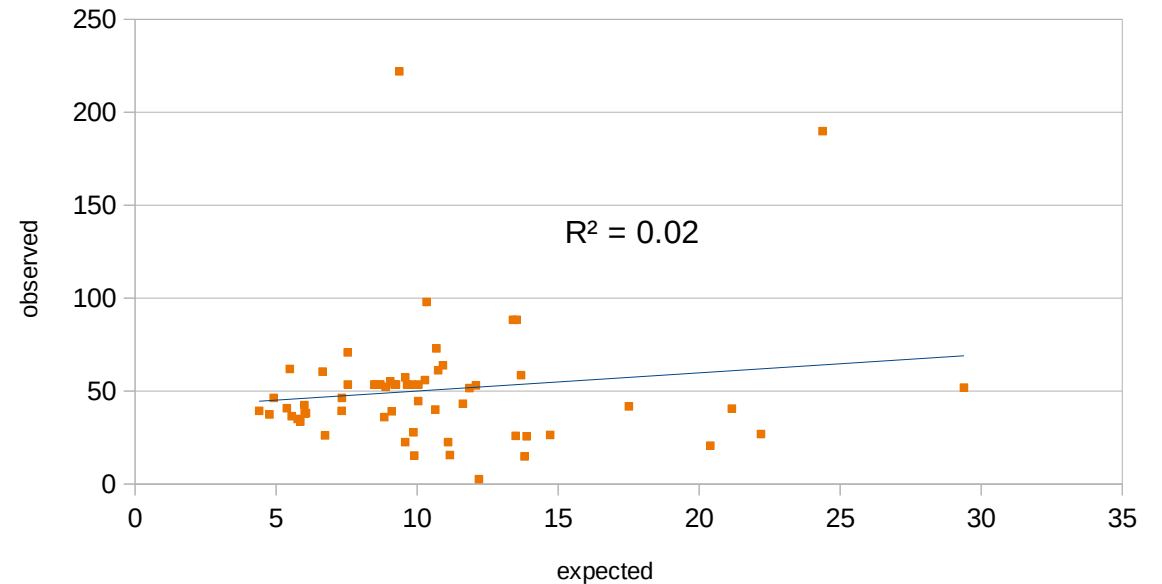
### Time Spent on Page

Expected vs Actual



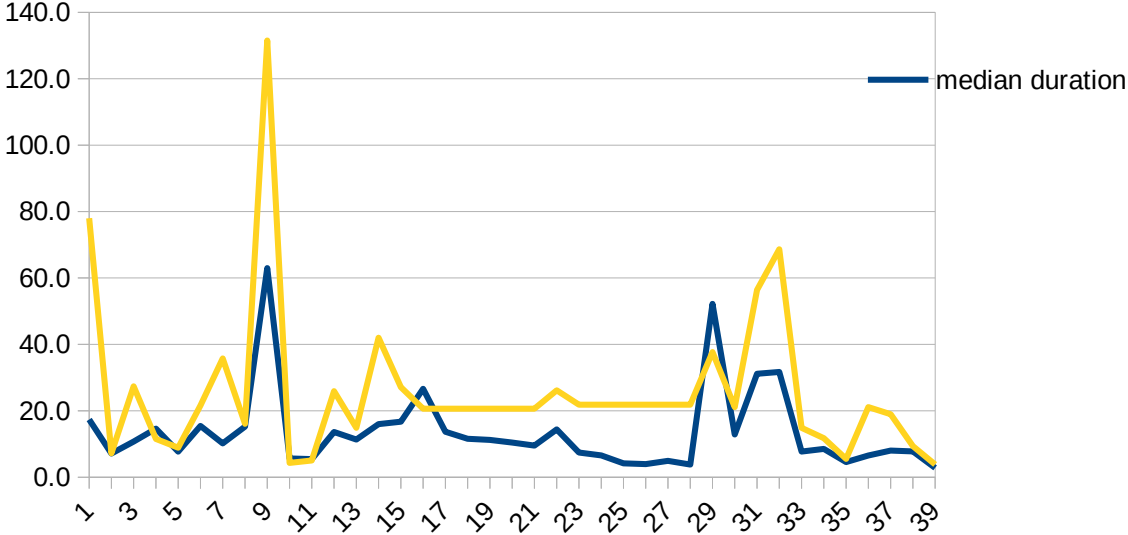
### Page Duration Correlation

Observed vs Expexted

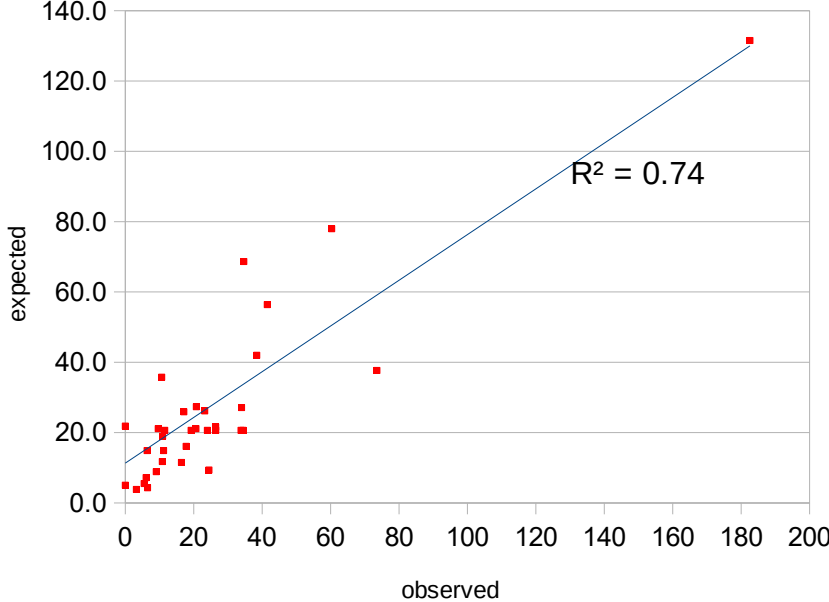


# Exhibit D: A Legitimate Sample

Page Duration  
reference UK project



Page Duration Correlation  
observed vs expected



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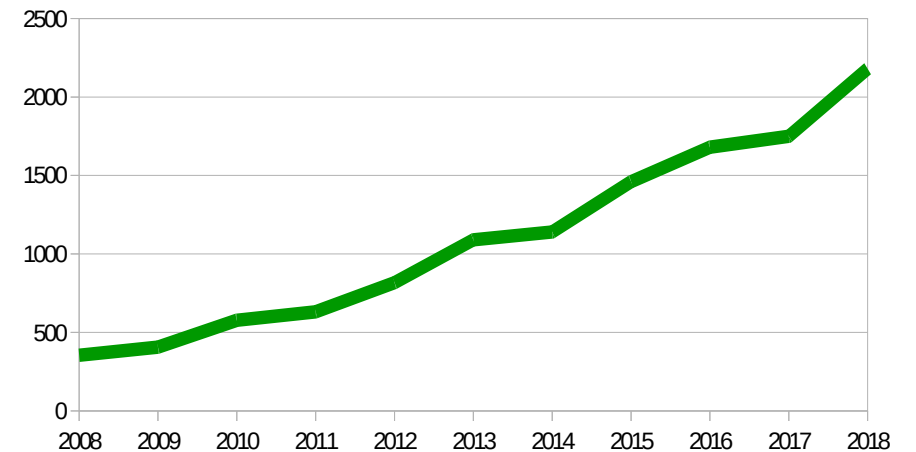
# What's Ahead

# DCE's and Data: Trends

- DCE papers increased of 60% year on year
- Anecdotal agreement by commercial world
- DCEs approved as evaluation method by FDA
- Holy war emerging between SP, RP, AI and Machine Learning
- Increasingly Sophisticated arms race between Fraud and Anti-Fraud measures.

Academic Papers with "Discrete Choice Experiment" in Abstract

Source: Google Scholar



# Questions and Discussion?

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Thank You