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Information Science as a feature of microeconomic frames for restraint reduction

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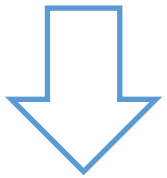
Contains spoilers under academic privilege

Game Theory

- Study of conflict and collaboration, e.g. Prisoner's Dilemma
- Two classical types of move
    - Terminal (winning or preparing to win)
    - Informational (to get info, e.g. bluffing, may run counter to terminal in short term)
- Two extensions by current author for reducing restraint
    - Wisdom: increasing empathy, collaborative capacity in either player (e.g. calming, treating, teaching)
    - Externalities (breaking out to other games)

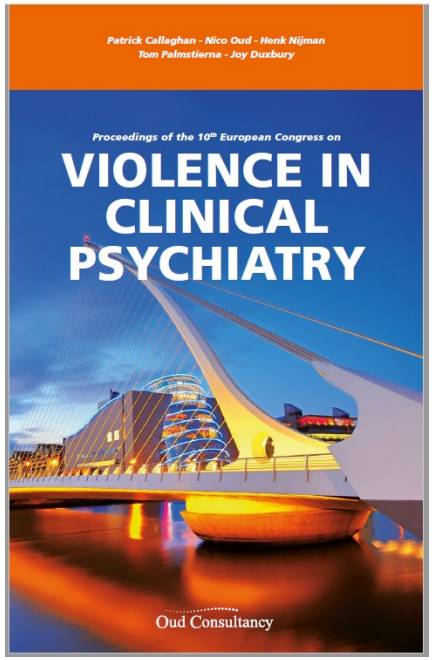
Game Theory literature suggests good clinical practice

In the game theory literature while optimising a non-zero sum game, perfect mutual information is desirable



Focus on insight; co-production; confidentiality

Information for nonzero sum games at person-person level



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Violent Phenomenology, Patient/Staff Disclosure and Collaboration: Game Theory Analysis

Poster

Evelyn Rogerson, Keith Reid, Sandeep Reehl & James Brotherson (UK)

Keywords: Game theory, modal, strategy, collaboration, rational, dominance, positive, tell, forensic, violence, risk, formulation, future

A secure care game

- Two players:
  - patient with a serious offence who is better now
  - staff
- If the patient begins to relapse: should they hide/admit/tell?
- Should staff be careful/positive/carefree?
- We asked patients and staff:
  - How do expect those nine combinations to benefit you?
  - How do you think the other answers?

Reid et al EViPRG 2017

Fig 1 the modal home game		Staff decide to be…		
		Careful	Positive	Carefree
Patient decides to…	Hide	Bad for patient; Very bad for staff	Bad for patient; Bad for staff	Very Bad for patient; Very Bad for staff
	Admit	Good for patient; Good for staff	Good for patient; Good for staff	(Very Bad or Bad) for patient; (Very Bad or Bad) for staff
	Tell	Good for patient; (Evens or Good or Very Good) for staff	Very Good for patient; Very Good for staff	Good for patient; Very Bad for staff

Other ways in which nonzero sum games at person-person level can frame restraint reduction

“I want a f*ing discharge now” How patients use aggression to resist staff displays of deontic authority in a mental health hospital**

Deamer F, Hamann M, Reid K, Lavelle M. Jul 2023

16th Biennial International Association for Forensic and Legal Linguistics: IAFLL

Linguists analysing body worn camera footage of incidents

- staff experiencing extremely high deontic authority

- patients respond with aggressive turns

- staff produce open questions... intonation can render them hearable as demanding an answer

- we suggest how staff might adapt their communication to enhance the agency of patients in an otherwise extremely disempowering context.

“I want a f*ing discharge now” How patients use aggression to resist staff displays of deontic authority in a mental health hospital**

- staff experiencing extremely high deontic authority TERMINAL

- patients respond with aggressive turns; WISDOM

INFO - staff produce open questions... intonation can render them hearable as demanding an answer

WISDOM - we suggest how staff might adapt their communication to enhance the agency of patients in an otherwise extremely disempowering context TERMINAL WISDOM

Game Theory reading of ongoing work

Gross Bimodal Diurnality in Dementia Behavioural Symptoms in an Inpatient Setting: High Noon and Sundown.

Related to: *Anderson D, Hamza D, Reid K, Richardson J. In: RCPsych International Congress 2022. 2022, Edinburgh: Cambridge University Press. (ARCADIA workstream with Newcastle University)*

There is more to the time course of challenging behaviour than “sundowning”

Colder temperatures and hotter temperatures both increase violence

Game Theory reading of ongoing work

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Related to: *Anderson D, Hamza D, Reid K, Richardson J. In: RCPsych International Congress 2022. 2022, Edinburgh: Cambridge University Press.*

Colder temperatures and hotter temperatures both increase violence

Given similar information and externalities

- lunchtime and tea time might be a harder terminal task TERMINAL
- perhaps heat and cold make empathy/negotiation harder for all WISDOM

Game Theory at provider level

Some typical restraint reduction themes analysed by move type

Based on their intended effect on the therapeutic alliance of nurse and person in care

Restraint Reduction

TERMINAL – bringing about a desired end, preparation, including setting it as a target

- Develop staff training and education TERMINAL
- Clinical support and supervision
- Post incident support and review
- Recruitment and retention TERMINAL
- Therapeutic Environments TERMINAL
- Criminal Justice and Police Liaison
- Organisational boundaries and clear documentation TERMINAL
- Joint policy development – e.g. R.T.
- Interagency working and information sharing
- MDT working and collaborative risk management TERMINAL
- Robust organisational reporting and monitoring arrangements TERMINAL
- Service user and carer involvement TERMINAL
- Some cultural and learning outreach

Restraint Reduction

INFO: getting or sharing information to allow best non-zero sum outcome

INFO • Develop staff training and education
INFO • Clinical support and supervision
INFO • Post incident support and review
• Recruitment and retention
• Therapeutic Environments
INFO • Criminal Justice and Police Liaison
• Organisational boundaries and clear documentation INFO

• Joint policy development – e.g. R.T. INFO
• Interagency working and information sharing INFO
• MDT working and collaborative risk management INFO
• Robust organisational reporting and monitoring arrangements INFO
• Service user and carer involvement INFO
• Some cultural and learning outreach

Game Theory at provider level

UK guidelines on strategy for reducing restraint

Now the “player” is the hospital/school AKA “provider”

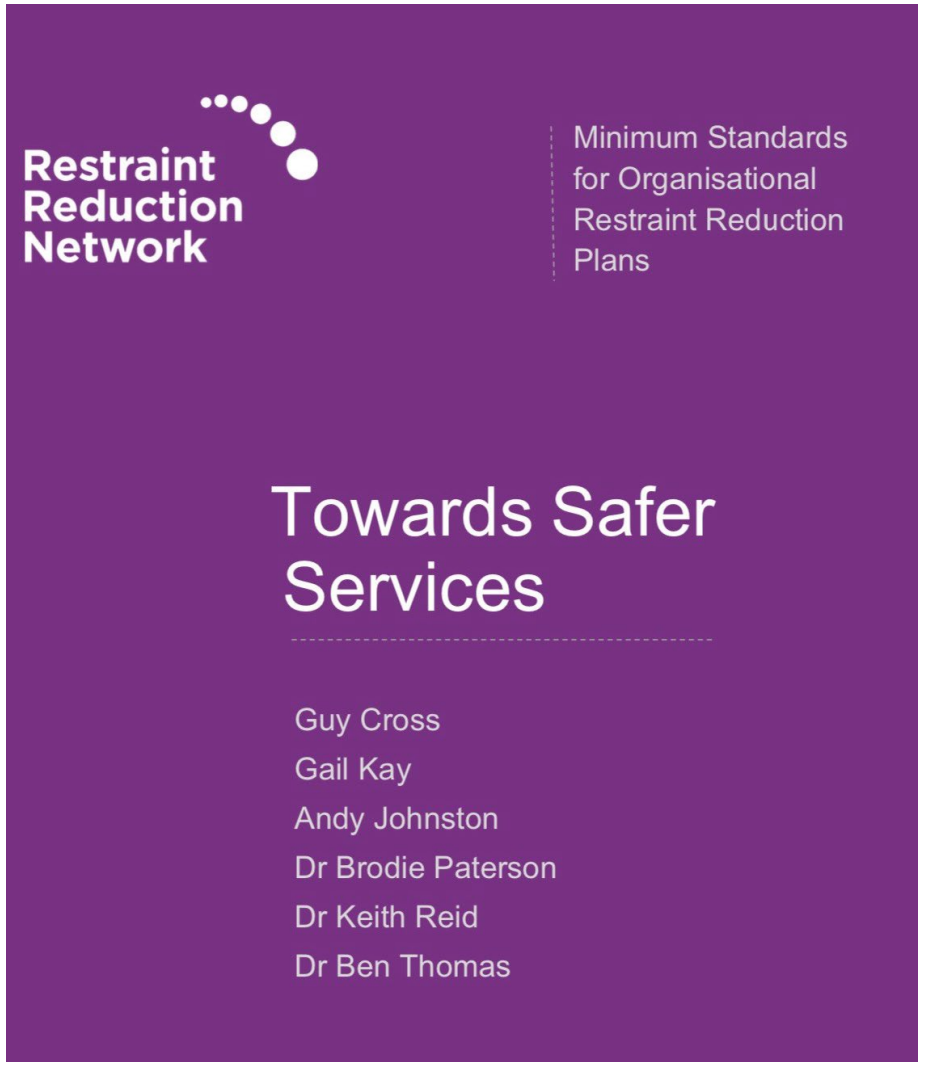
Current author helped write and coordinated final versions

Emphasised a concern for information to increase collaboration

TOWARDS SAFER SERVICES

NATIONAL MINIMUM STANDARDS for ORGANISATIONAL RESTRICTIVE INTERVENTION REDUCTION PLANS

Authors
Guy Cross – Regulatory Policy Officer – Mental Health Care Quality Commission
Gail Kay – Nursing and COO Cumbria, Northumberland, Tyne and Wear NHS Foundation Trust
Andy Johnston – Clinical Director, AndyJohnstonAssociates / Director of Policy and Public Relations, National Association of Psychiatric Intensive Care Units (NAPICU)
Dr Brodie Paterson – European Network for Training in the Management of Aggression
Dr Keith Reid – Consultant Psychiatrist, Associate Medical Director Positive and Safe Care, Cumbria, Northumberland, Tyne and Wear NHS Foundation Trust
Dr Ben Thomas– NHS Improvement



Scope and Purpose

- Any UK/British organisation which might restrain people, for the whole organisation
- So it is generalisable between schools, social care, hospitals
- Provide a framework that organisations can use to develop strategy and steer their mission to reduce the use of unnecessary restrictive practices

Example of a Standard

1.2 Involvement of people who receive services and their carers in strategy development and implementation

TERMINAL *III. Decision making teams at differing operational levels, such as boards, steering groups, project teams and leadership teams, especially in large organisations, include individuals with explicitly declared lived experience of* INFO *services such as representatives of people receiving services, peer support workers, or governors with lived experience.* EXTERNALITIES

INFO *IV. There is evidence of the involvement of people with lived experience in decisions, at different organisational levels.* WISDOM

Game Theory at provider level

Decisions under uncertainty

Concerning non-reporting of restraint by providers

Despite recent legislation demanding reporting

From the perspective of a director like me who cares about the nurse-patient alliance

An institutional dilemma

Question:

I must report my hospital's restraint data
Others do not report completely
Those providers might not know their figures
How can they reduce restraint if they don't count it?
Our nurses are discouraged

An institutional dilemma

Formulation:

Incompletely reporting providers can be seen as defecting from a legitimate terminal aim of open society

They are also impairing information which could otherwise help nurses and persons in care

There is a regulator and media which represent external opportunities

More complete information sharing represents wisdom i.e. an increase in collaborative behaviour by providers

An institutional dilemma

Answer:

Make methods to interpolate the data
Apply that to defecting providers
Share those methods with the regulator
Develop a score for disinformation
    avoid it being too boring/esoteric/arcane for media

PROD-ALERT

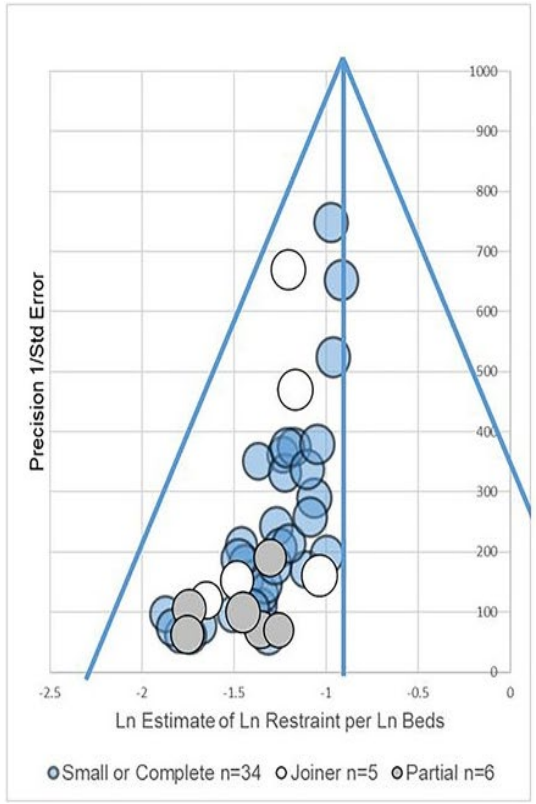
BRIEF RESEARCH REPORT article

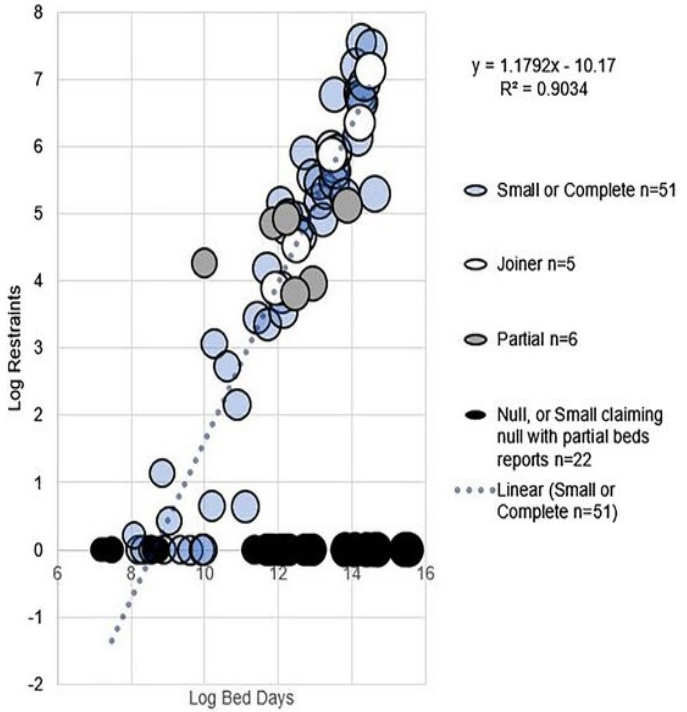
Front. Digit. Health, 12 August 2022

Sec. Health Informatics

https://doi.org/10.3389/fdgth.2022.945635

PROD-ALERT: Psychiatric restraint open data—analysis using logarithmic estimates on reporting trends. Reid KS, Price O.





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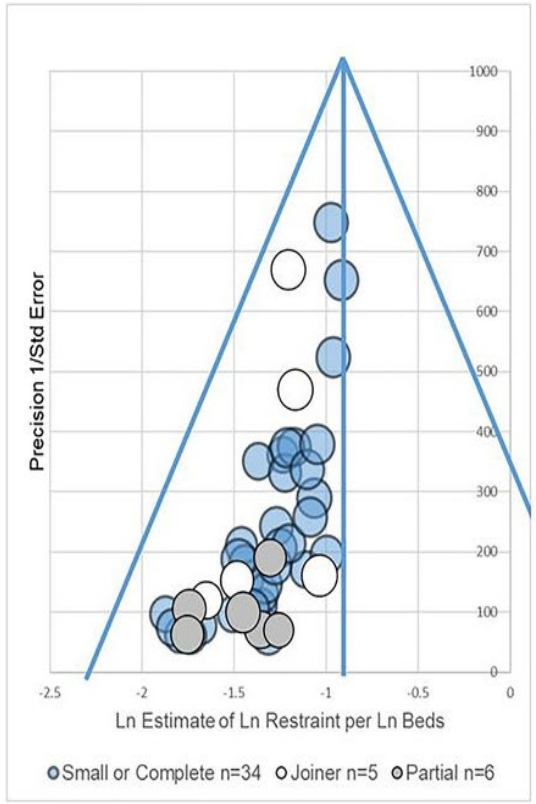
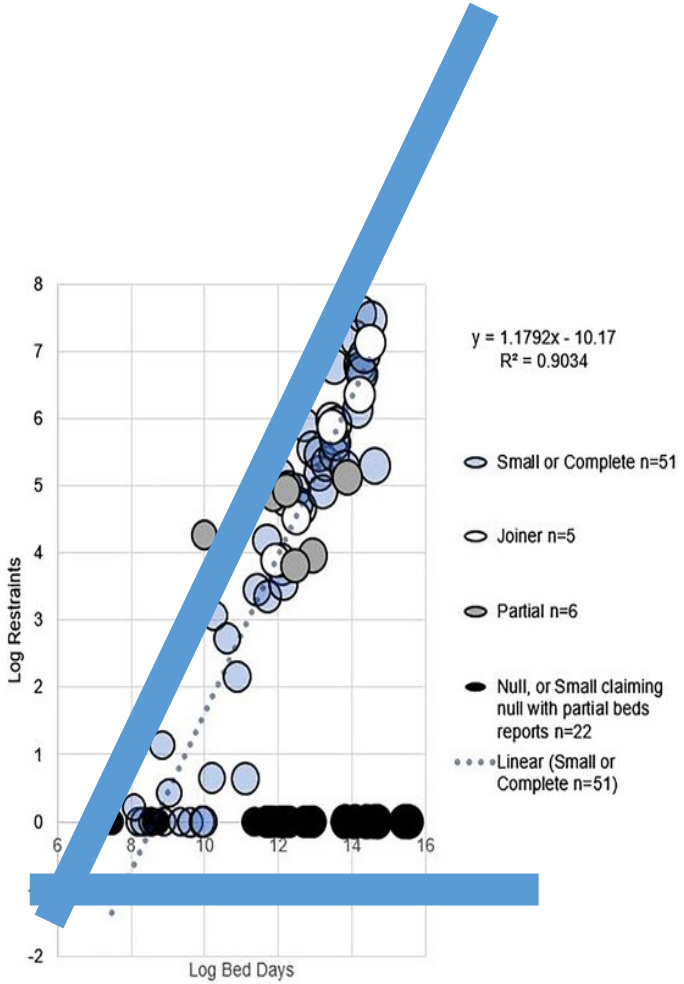




PROD-ALERT 2 SPOILER

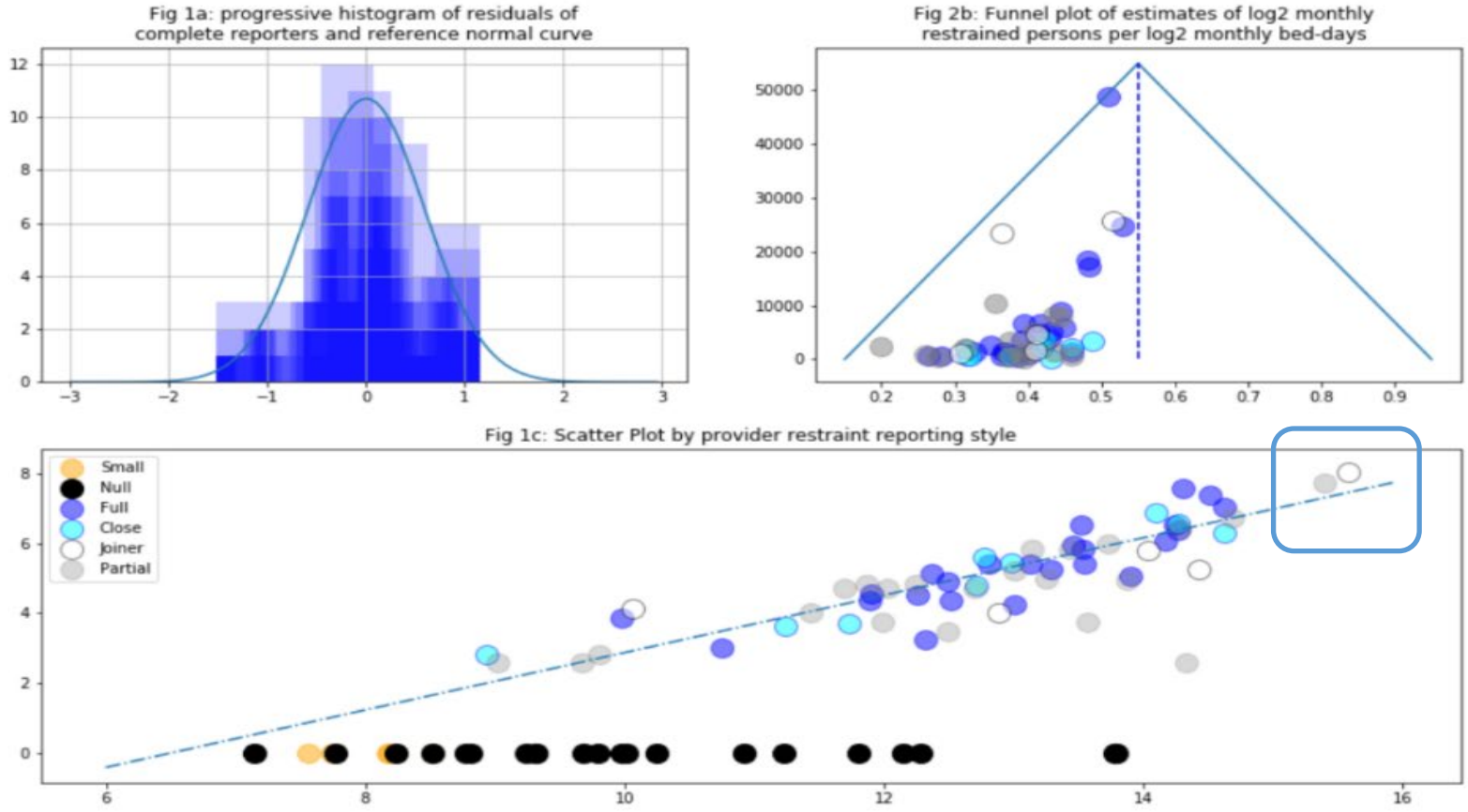


Figure 1. Residuals against trend LnRestraint/LnBeds. Asymmetric funnel plot. 1(c) L-sign scatter plot of LnRestraint/LnBeds.

PROD-ALERT 2 SPOILER

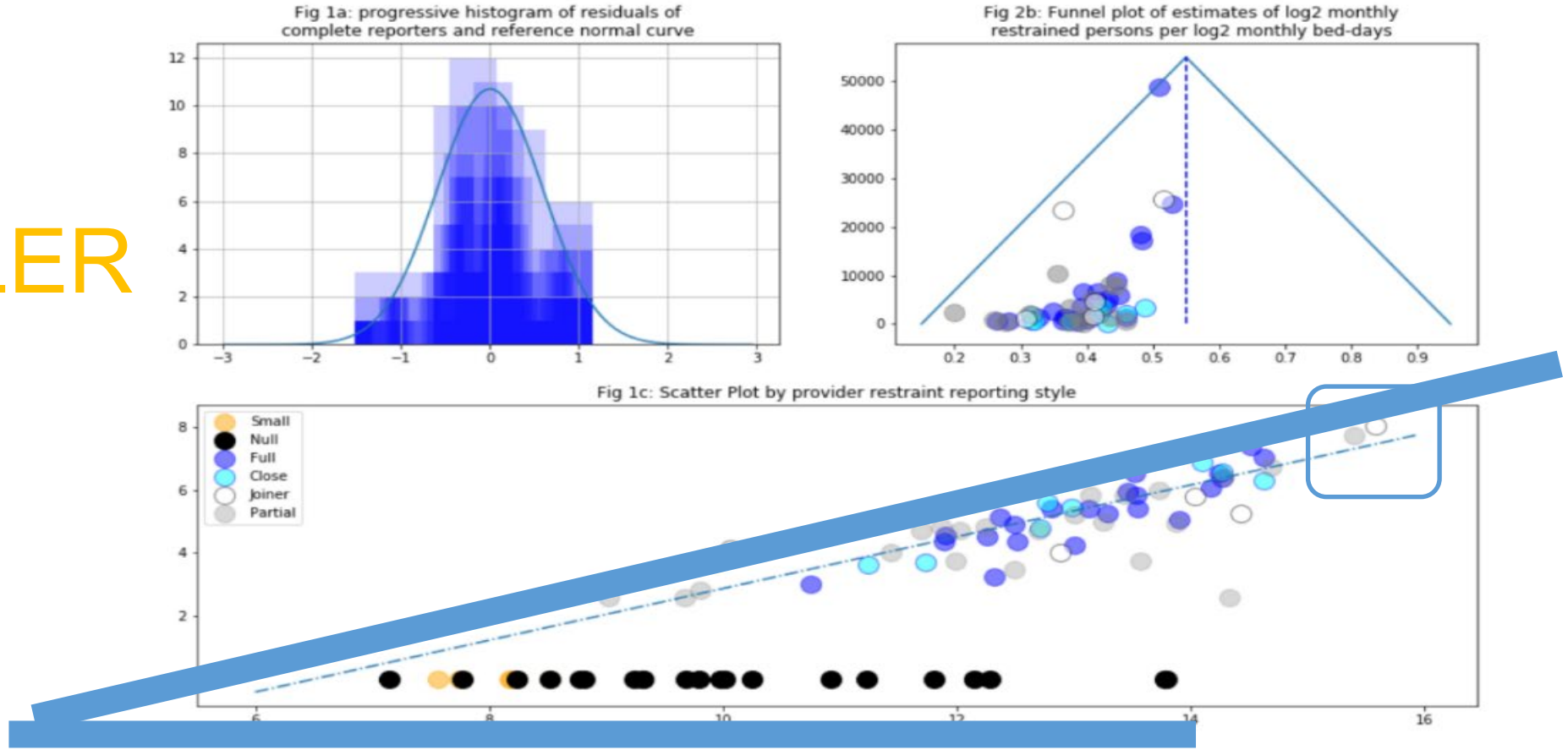
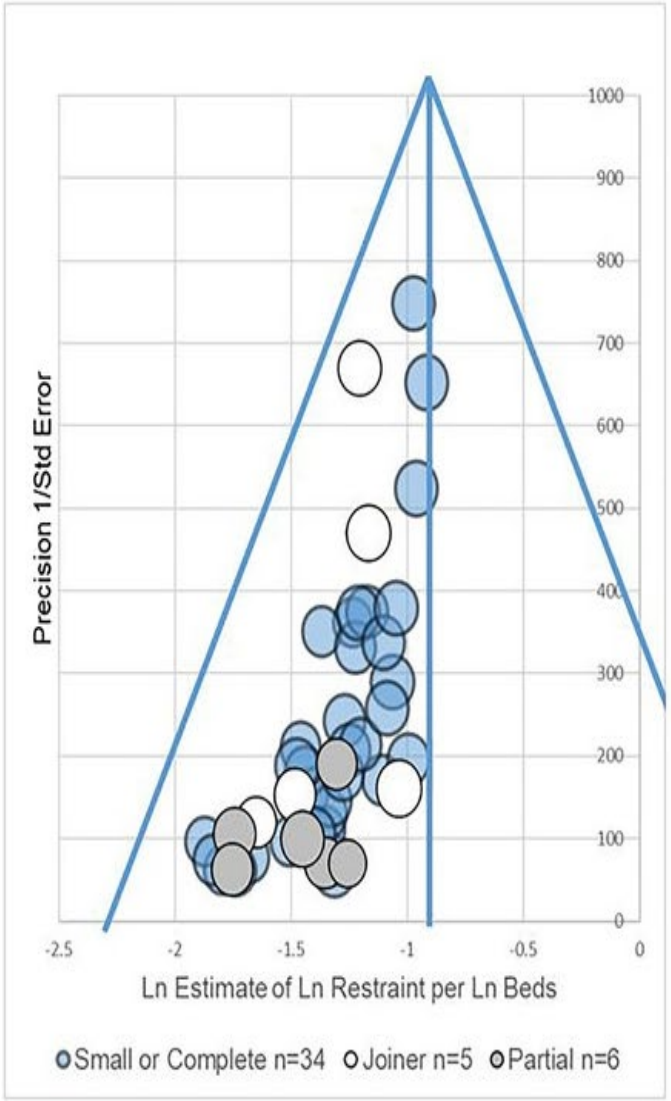
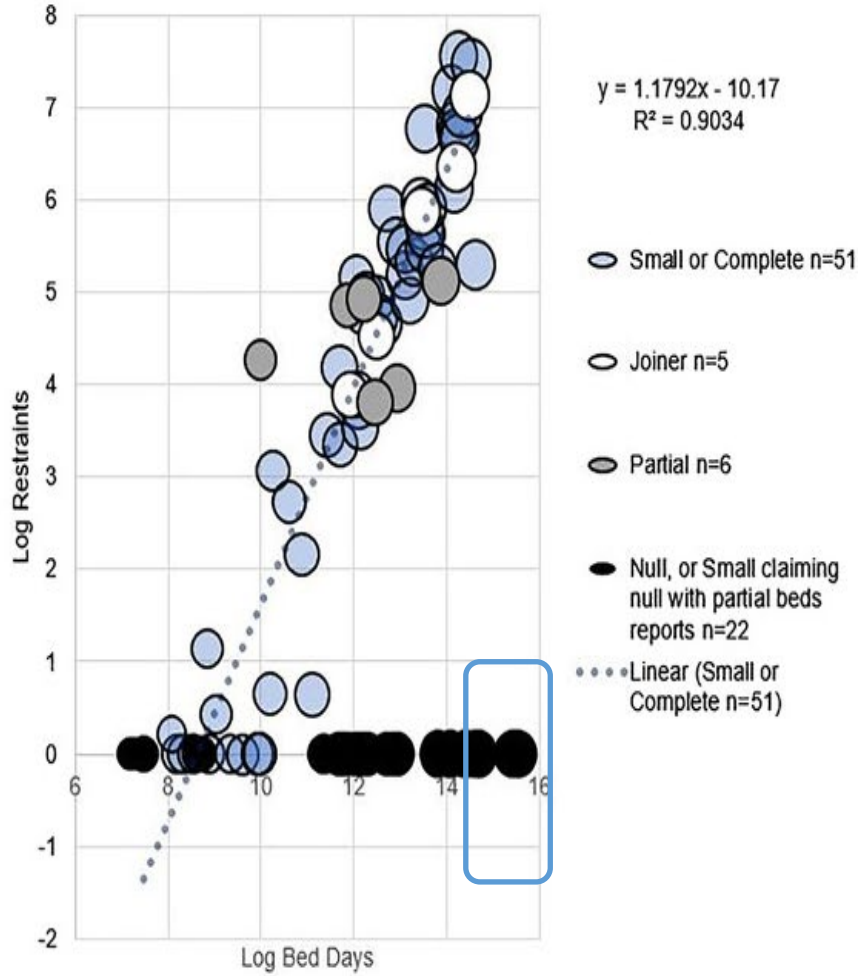


Figure 1. Residuals against trend LnRestraint/LnBeds. Asymmetric funnel plot. 1(c) L-sign scatter plot of LnRestraint/LnBeds.

PROD-ALERT

The largest providers* declare no restrained people per month for a whole year even though estimates by MHA detentions and size make that seem really unlikely





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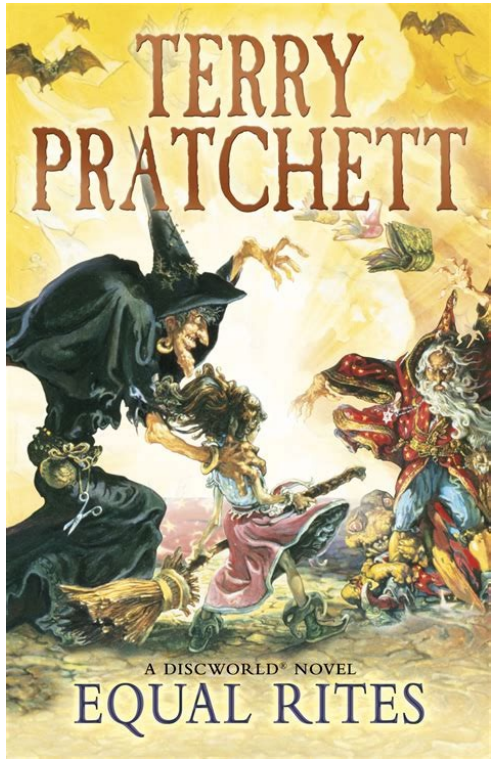
L-TEST



Zoons are a tribe in Pratchett's Discworld who cannot easily lie.

To become the tribal liar, ambitious young Zoons competitively attempt small lies such as "actually my grandfather is quite tall".

L-Test takes that concept of the quantity of disinformation and turns it into a metric whereby dis-information in data sets is expressed in e.g. lies about height.

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L-TEST

BMJ Open

Keith Reid
'A friendly accessible description of The “L-test” – measuring (dis)information in incomplete incident reporting’

How disinformative are false nulls?

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Briefly, L-test changes the relative unlikeliness of data

into a score related to disinformation, and allows a common language

for disinformation

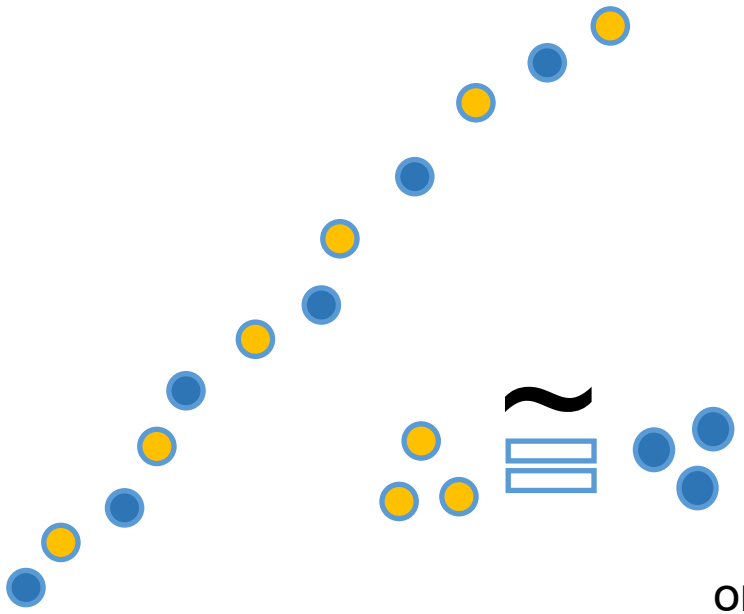
information *h* = -log(p) of an event…

A certain event adds no information

A 50% chance event, p=0.5, carries 1 bit of information, equivalent to one coin toss

A 1/8 chance event carries 3 bits of information

A 1/16 chance event carries 4 bits of information

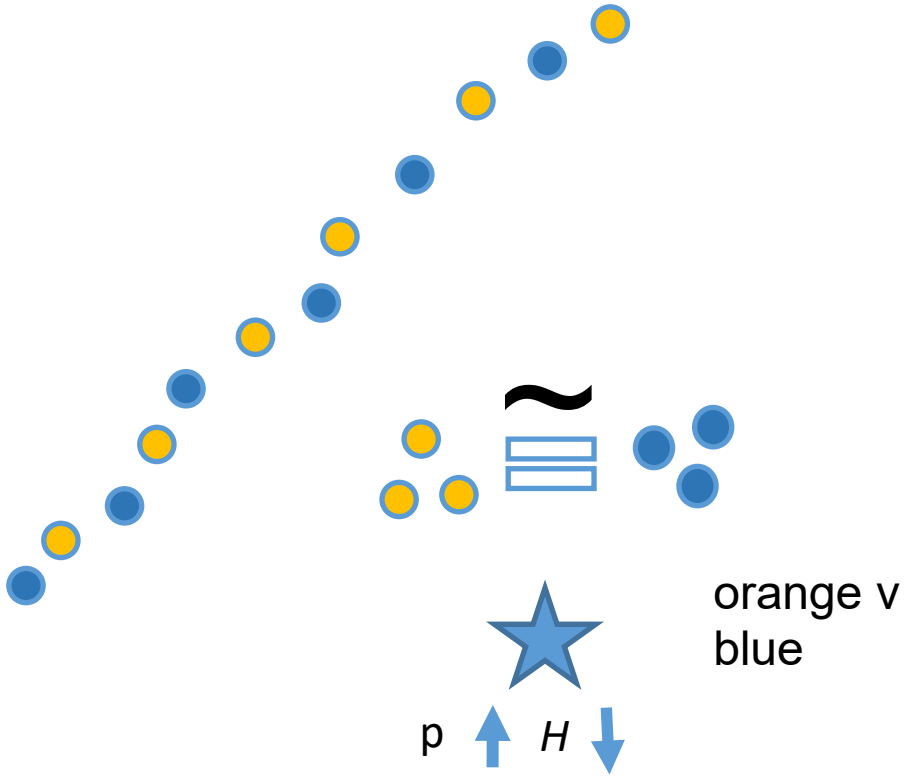


orange v blue

p ↑ *H* ↓

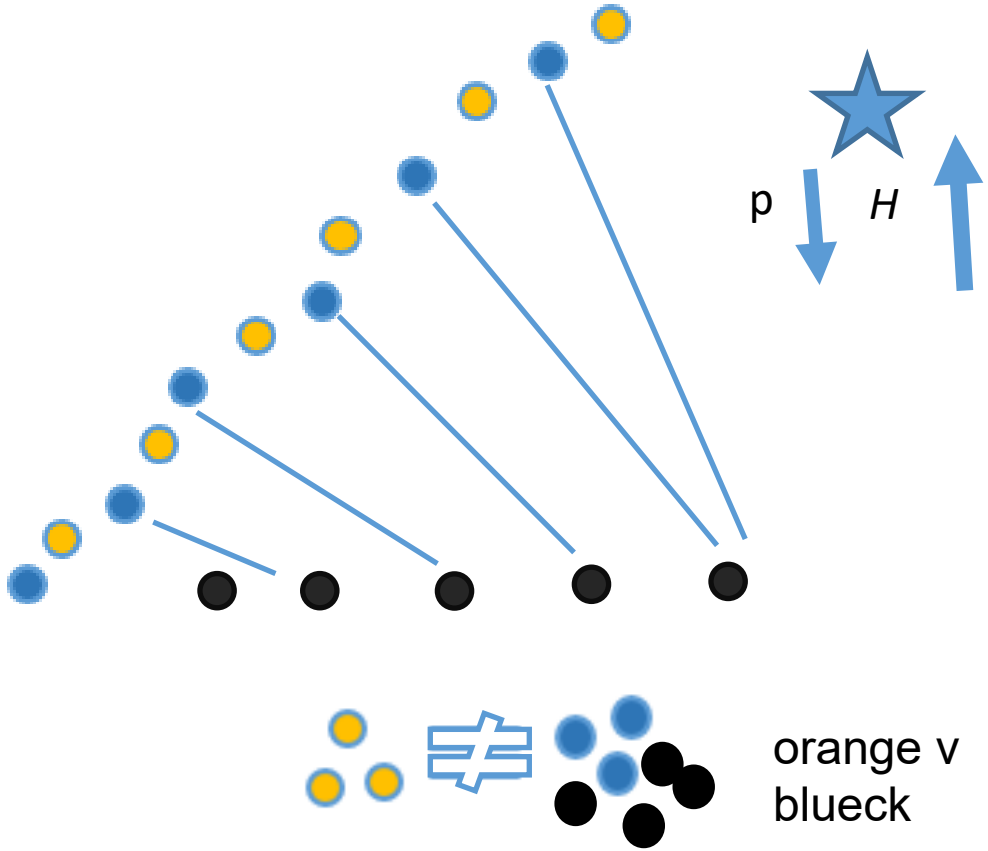
Blues are quite like oranges
Oranges add little extra information

Without nulls blues are quite like oranges and have little extra information



orange v blue

With nulls ~~blues~~ bluecks are no longer like oranges and now have disinformative surprise



orange v blueck

Methods

1. Split complete log-log report estimates from open source data e.g. restrained persons per month vs bed-days per month, into alternate halves E “even” and O “odd” going out from origin. This “toy” diagram uses science fiction character height vs mass.

2. Count probability p(E~O) that E and O are similar using Mann-Whitney U test; p(E~O) tends to 1.0 for similar E and O.

3. Calculate h(E~O) information as –log(p(E~O)), tending to 0.0 for large similar E and O being “unsurprisingly” similar.

4. Construct a noisy odd group “NO” made of O mixed with estimates from incomplete reporters.

5. Calculate h(E~NO) information, approaching high values as incomplete reporters make E seem falsely surprising.

6. L-test is the proportional increase in h(E~O) due to disinformative noise in h(E~NO) :

$$L = \frac{h(E\sim NO) - h(E\sim O)}{h(E\sim O)}$$

PA2 SPOILER

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3.3 Interpolation on size

The predicted number of people restrained per month in incomplete reporters was 1305 people per month (536 - 3233), 95% CI. This is a reduction since the similar estimate in PA1 regarding the previous year.

PA2 SPOILER

A suggestion to use persons restrained per month
As well as or instead of “rates” of restraint
- easier to check with the person restrained
- harder to undercount
- tallies with bed use the financial metric as a per head measure
- tallies with detained persons per month the legal metric too

3.3 Interpolation on size

The predicted number of people restrained per month in incomplete reporters was 1305 people per month (536 - 3233), 95% CI. This is a reduction since the similar estimate in PA1 regarding the previous year.

PA2 SPOILER

EXTERNALITY: get the regulators to take an interest

WISDOM: get people to realise that log restraint varies with log size

INFO: obvious info themes

TERMINAL: reporting is an important task

3.3 Interpolation on size

The predicted number of people restrained per month in incomplete reporters was 1305 people per month (536 - 3233), 95% CI. This is a reduction since the similar estimate in PA1 regarding the previous year.

L-TEST SPOILER IN PA2

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3.4 Height-expressed disinformation in the set

The L-test disinformation in English restraint data is 9.185. A description of height of English men contemporaneous to the Pratchett novel is 1.732m SD 6.6cm (Walker et al., 1988). In this context a similarly disinformative height estimate relative to average height is 193.9m. That is six foot three in imperial terms idiomatically used for height in England. Average height is that of Ed Sheeran, Bruce Lee or Ben Kingsley. Six foot three is the height of Christopher Reeves, Snoop Dogg and Abraham Lincoln.

L-TEST SPOILER IN PA2

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WISDOM in terms of a sense of humour

Conclusion

- Game theory analyses interactions under uncertainty and may be relevant to restrictive care
- Restraint reduction is a non-zero sum game
- A typology of moves emerges
- This may systematise and suggest new moves in restraint reduction
- Information is crucial
- Disinformation is measurable in a way which not so boring as to turn people off
- Similarly “game theory” might not be a good name: adapanomics?