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Farmer psychosocial factors associated with disease control

Naomi Prosser

Project background

- Mathematical models give important policy insights for livestock disease control
- Farmers treated as passive bystanders
- Most livestock disease have farmer-led control
- Situations when optional control measures for disease control nationally are not optimal for individual farmers

Project aims

- Understand differences in farmer behaviour for livestock disease control and how intrinsic psychosocial factors are associated with this

- Account for the dynamic, reactive & heterogeneous response of farmers in disease transmission models to understand the impact of farmer-led control on livestock disease outbreaks

Implications of the project

- Models incorporating farmer behaviour will allow improved predictions, such as:

- when farmer-led action is viable

- when non-compliance with nationally imposed measures is likely

- where small nudges may precipitate large changes in behaviour

Farmer-led Epidemic and Endemic Disease management (FEED) project

Epidemiologists, mathematical modellers, behavioural scientists & veterinarians from the Universities of Warwick & Nottingham

WARWICK
THE UNIVERSITY OF WARWICK

Michael Tildesley
Matt Keeling
Edward Hill
Paul Brown

} Infectious disease modelling & GUI development

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Martin Green
Jasmeet Kaler
Eamonn Ferguson
Naomi Prosser

} Psychosocial analysis & behaviour elicitation

https://feed.warwick.ac.uk/index.html

UKRI Biotechnology and Biological Sciences Research Council

Some work so far

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Cattle farmer psychosocial profiles and their association with control strategies for bovine viral diarrhea

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Bovine viral diarrhoea (BVD)

- Causes diverse production losses from farmers
- Endemic in UK
- Many different control strategies farmers can use

Methods

- Focus groups to investigate psychosocial factors of interest

- Survey sent out to UK cattle farmers
  - Psychosocial factors
  - Factors from a behaviour change framework
  - How farmers control BVD

- 475 completed responses

Altruism

Magnitude of concern for others in resource allocation

Synonyms: social value orientation, social preferences, social motives, welfare trade-off ratios, collective interest

Investigated using:

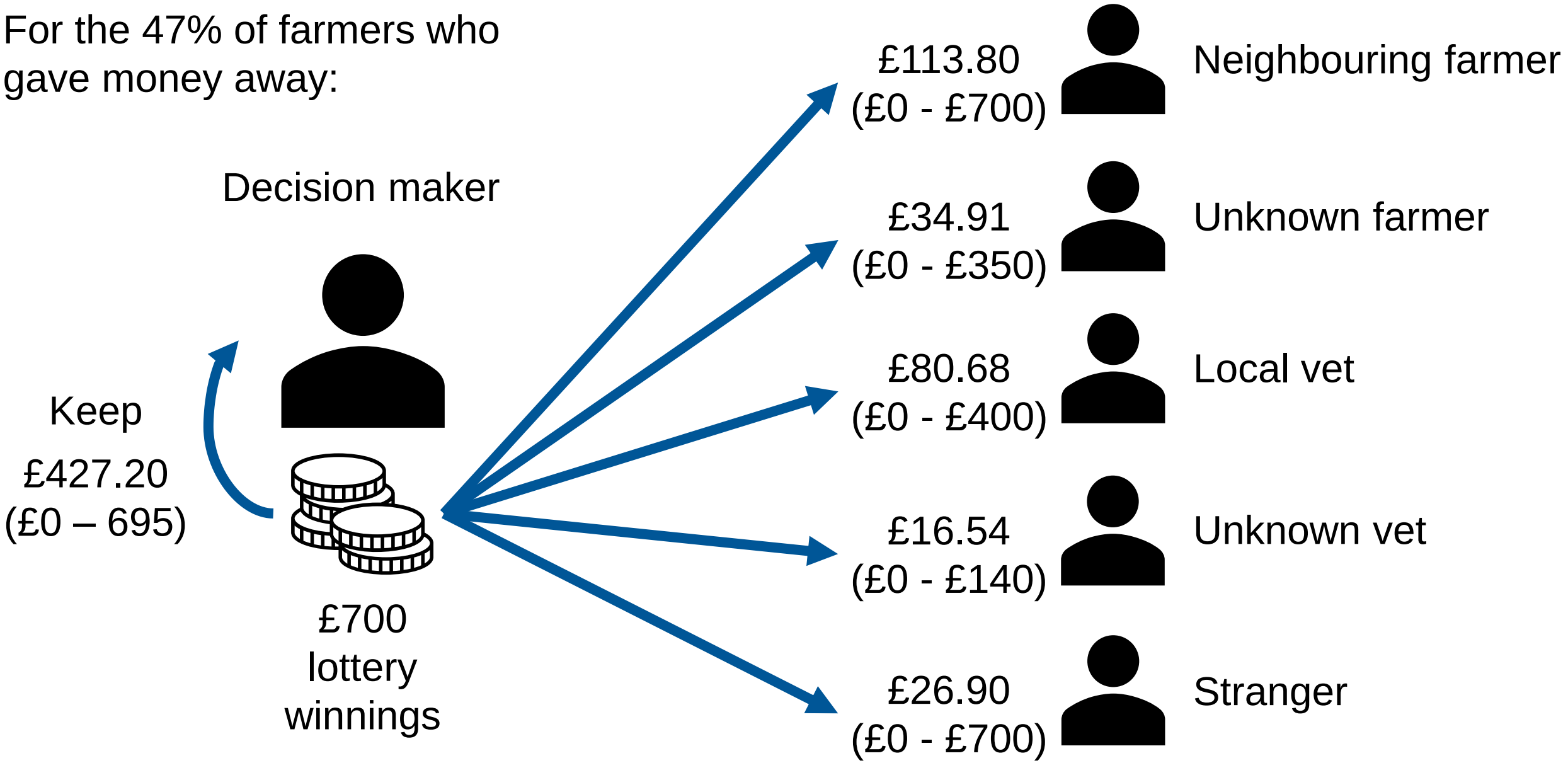
Dictator game (Kahneman et al., 1986; Forsythe et al., 1994)

Social value orientation slider-measure (Murphy et al., 2011)

Dictator game

(Kahneman et al., 1986; Forsythe et al., 1994)

For the 47% of farmers who gave money away:



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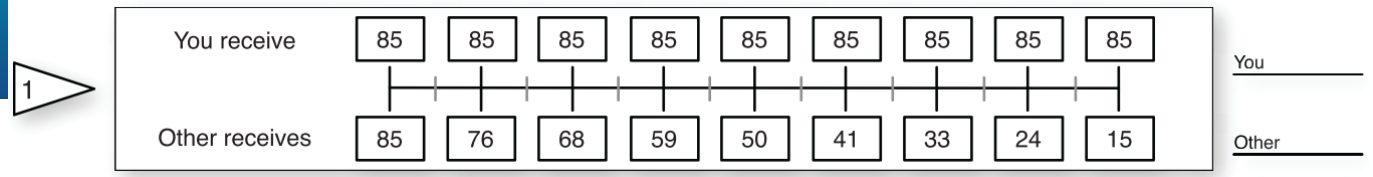
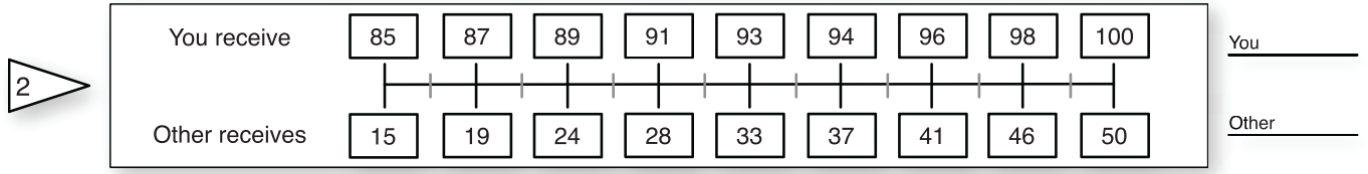
Social value orientation

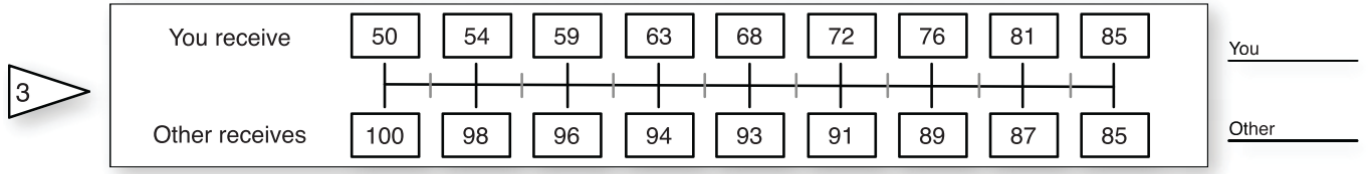
(Liebrand, 1984; Murphy et al, 2011)

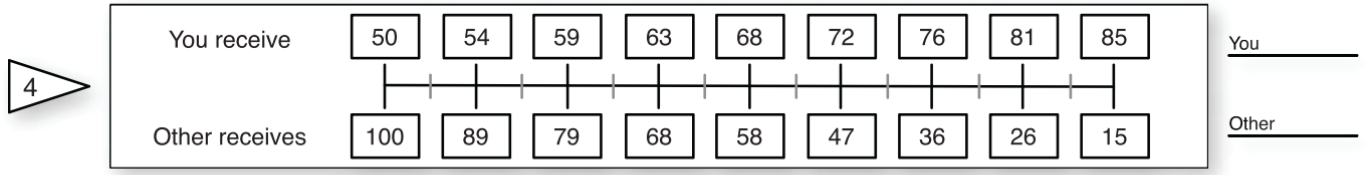
4 main categories of SVO:

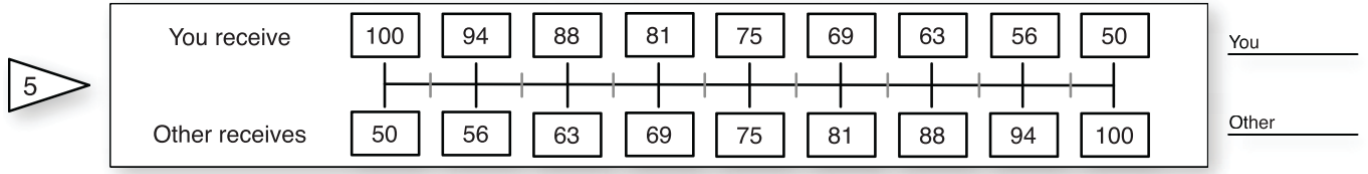
Altruistic	Maximise gain to other
Prosocial (2 types)	Maximise joint gain Minimise inequality
Individualistic	Maximise gain to self
Competitive	Maximise difference between gains

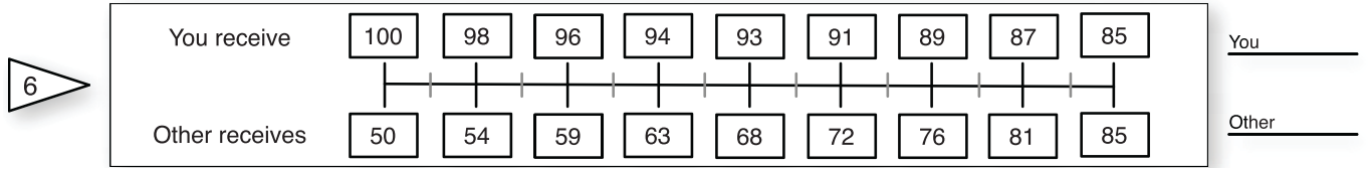












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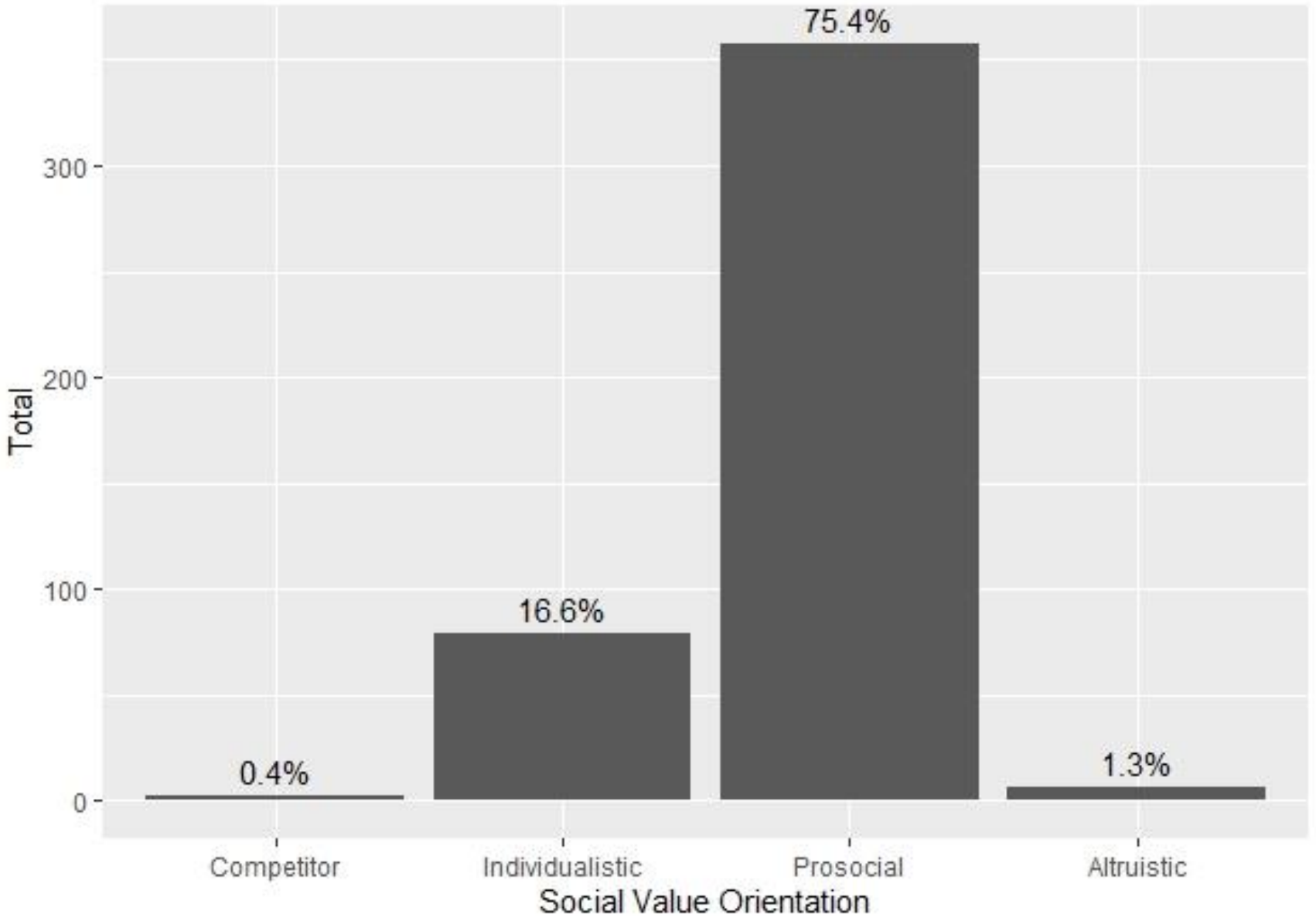
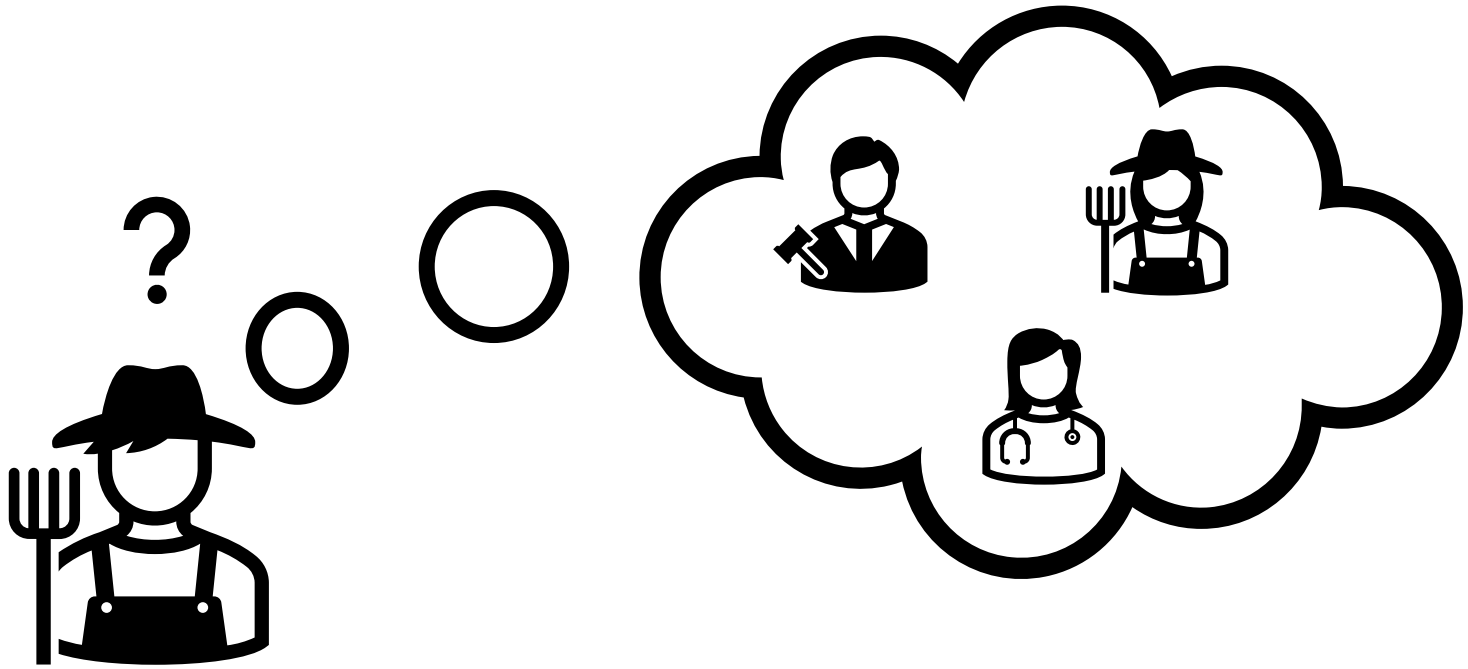
Cattle farmer SVOs



Beliefs and expectations in other the behaviours of other people



Investigated using:
Likert-scale statements
Investment/Trust game

Trust statements

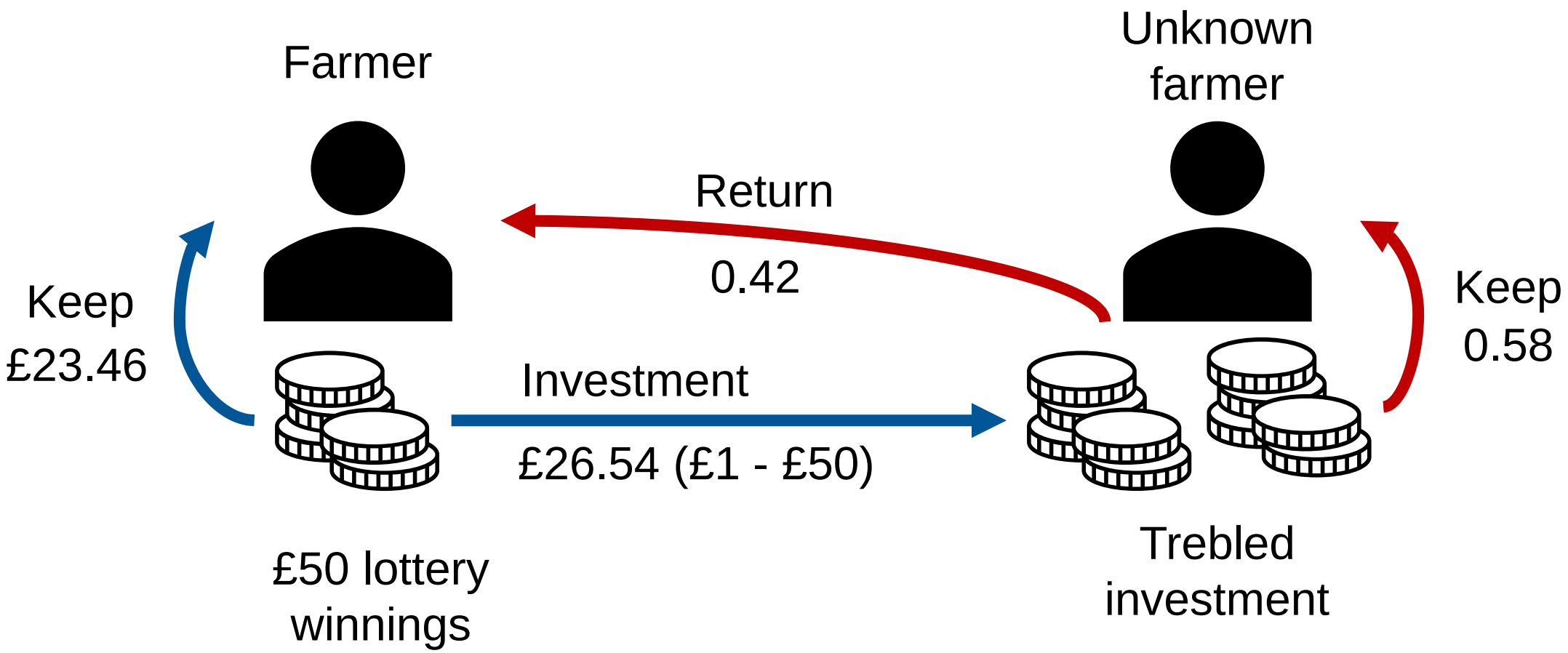
Factor	Item	Loading
Trust in farmers	I trust my neighbors to be controlling infectious diseases in their herds	0.78
	I trust other farmers nationally to be controlling infectious diseases in their herd	0.70
α = 0.79	I trust beef farmers	0.65
	I trust dairy farmers	0.50
	I trust other farmers I meet for the first time	0.41
Trust in vets	I trust my vet's advice about infectious disease control in my herd	0.88
α = 0.87	My vet would always tell me the truth even if it was not what I wanted to hear	0.81
	I trust vets	0.61
	Farmers receive high quality veterinary advice from the veterinary profession	0.59
	I feel respected by my vet	0.58
	I feel respected by the veterinary profession	0.49
Trust in Government	I trust governmental judgements about how to control infectious diseases in cattle	0.78
	I feel respected by the government	0.76
α = 0.76	I trust governmental organizations	0.65
	When dealing with the Government it is better to be careful before you trust them	-0.44

α = Cronbach's alpha

Investment/Trust game

(Berg at al., 1995)

74% of farmers made an investment:



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Economic games latent class analysis

Psychological proximity

How close a person feels to another

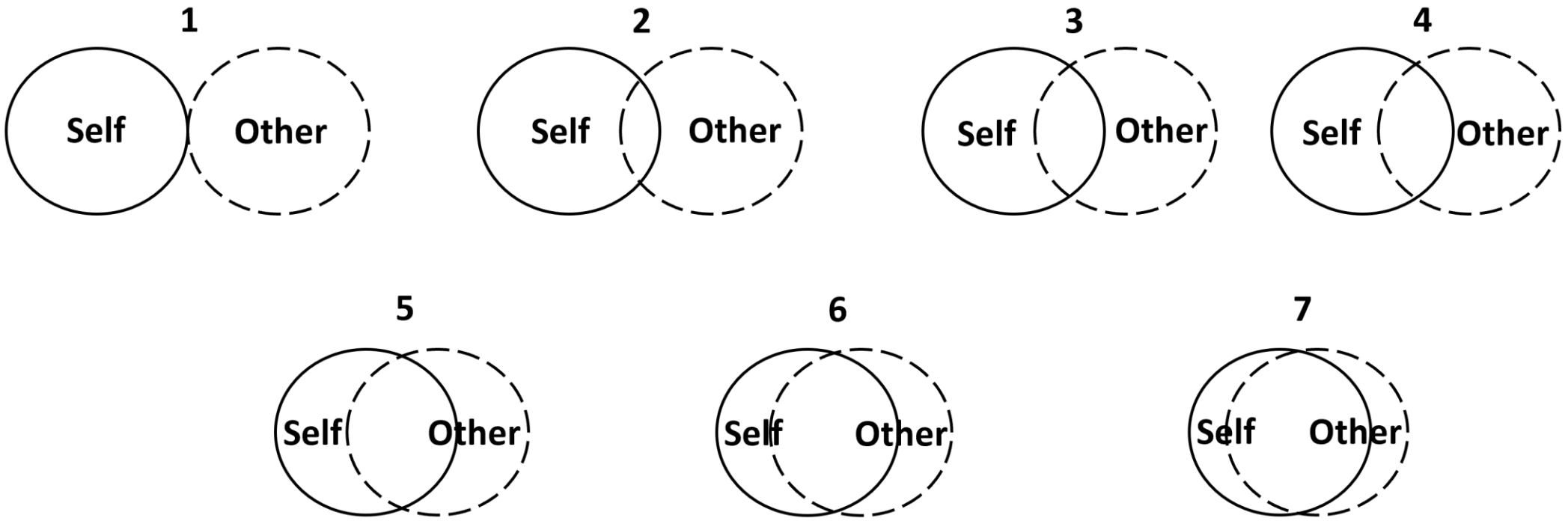
Encompasses:

- Connection
- Independence
- Feeling close (includes trust)
- Behavioural closeness
- Similarities

Investigated using:
Inclusion of other in self scale (Aron et al., 1992; Mashek et al., 2007)

Inclusion of other in self scale

(Aron et al., 1992; Mashek et al., 2007)

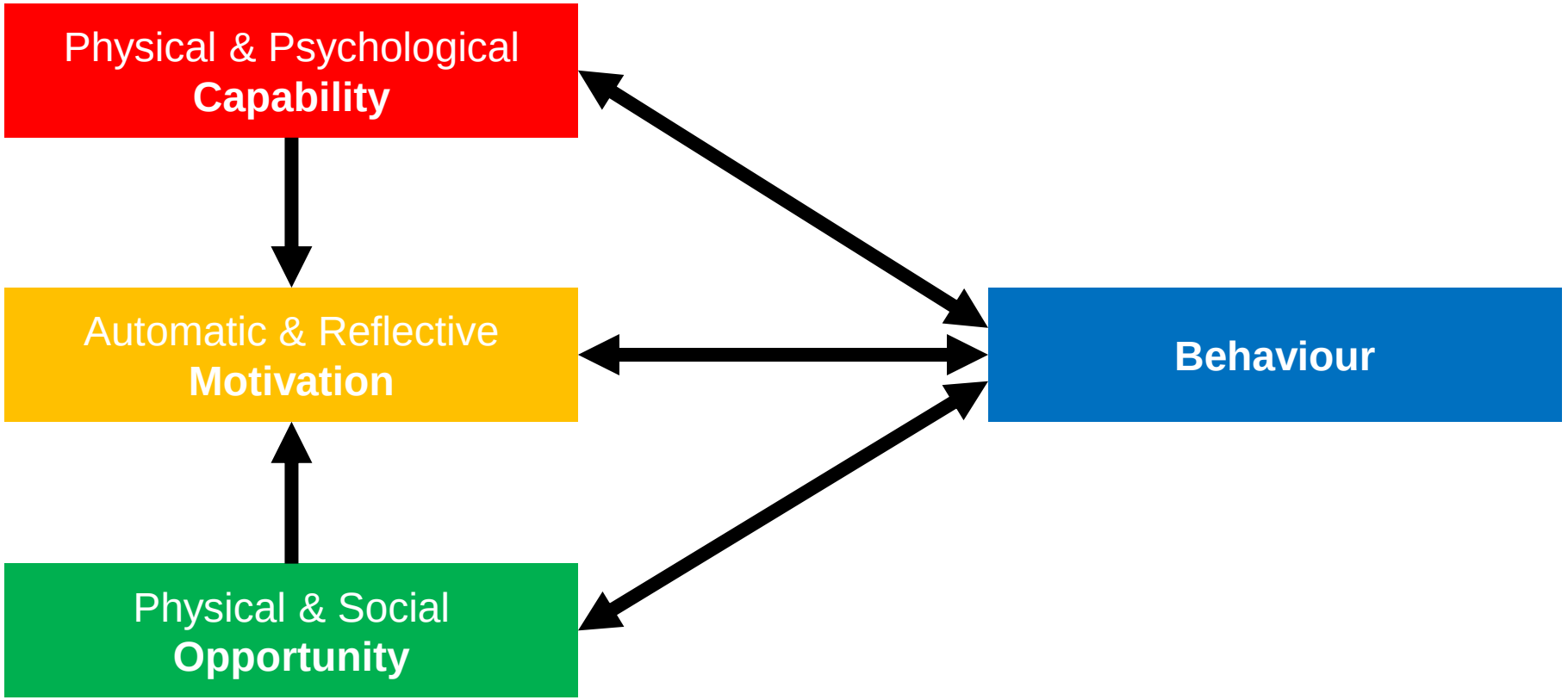


Farmer psychological proximity results

Increasingly close

	Mean score
Their vet	4.8
Neighbouring farmers	3.9
Vets in general	3.5
Dairy farmers	3.4
Beef farmers	3.3
Farmers in general	3.3
Government	2.0

COM-B framework of behaviour change



(Michie et al., 2011; Michie et al. 2014)

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BVD control latent classes

Class	Percent of farmers	Typical practice (> 60% of farmers)	Atypical practice (< 40% of farmers)
 **Do nothing**	12%		Isolate or test new cattle (34%) Closed (25%) Buy only from BVD-free herds (8%) Separate from neighbouring stock (8%) Blood or tissue test (8%) Vaccinate (4%)
 **Vaccinate**	25%	Vaccinate (94%) Blood or tissue test (66%)	Closed (28%) Buy only from BVD-free herds (22%) Separate from neighboring stock (10%)
 **Take care introducing new cattle**	16%	Blood or tissue test (88%) Isolate or test new cattle (82%) Buy only from BVD-free herds (67%)	Closed (19%) Vaccinate (4%)
 **Use many controls**	31%	Test or isolate new cattle (95%) Blood or tissue test (89%) Buy only from BVD-free herds (88%) Separate from neighbouring stock (80%) Vaccinate (74%)	Closed (11%)
 **Separate herd**	15%	Closed (99%) Separate from neighboring stock (84%) Blood or tissue test (77%)	

Psychosocial factors associated with BVD control

Altruism

- Not associated with BVD control in the multivariable model

Trust

- Low trust in farmers associated with using many controls or keeping a separate herd

Economic games

- Farmers who invested everything in the investment game were associated with being careful introducing new cattle

Psychological proximity

- High psychological proximity to dairy farmers & low psychological proximity to beef farmers associated with the vaccinating classes
- High psychological proximity to the vet associated with using many controls

COM-B factors associated with BVD control

Capability

- High psychological capability associated with having a separate herd

Opportunity

- High physical opportunity associated with having a separate herd

Motivation

- High motivation associated with the vaccinating classes

Conclusions

- Farmers have different behavioural strategies for BVD control which are associated with psychosocial & COM-B factors

- Important factors were:
  - psychological proximity to the vet
  - lack of trust in other farmers
  - high understanding of how & why to control infectious disease
  - enough time & money
  - motivation

Next steps

- Investigating how the psychosocial factors relate to behaviour in an evolving disease epidemic scenario
- Incorporating farmer psychosocial and behavioural differences into the disease transmission models