



# Banff International Research Station

for Mathematical Innovation and Discovery

## Information processing, rational beliefs and social interaction (10w2133)

August 27 - August 29, 2010

### MEALS

Coffee Breaks: As per daily schedule, 2nd floor lounge, Corbett Hall (*included in workshop*)

*\*\*For meal options at The Banff Centre, there are buffets in the Vistas Main Dining Room, 4th floor, Sally Borden Building (breakfast: 7:00 – 9:30 am; lunch: 11:30 am – 1:30 pm; dinner: 5:30 – 7:30 pm), and Gooseberry's Deli, located on the 2nd floor of the Sally Borden Building. There are also plenty of restaurants and cafes in the town of Banff, a 10 to 15 minute walk from Corbett Hall.\*\**

### MEETING ROOMS

**All lectures will be held in Max Bell 159. LCD projector, overhead projectors and blackboards are available for presentations.** *Note that the meeting space designated for BIRS is the lower level of Max Bell, Rooms 155-159. Please respect that all other space has been contracted to other Banff Centre guests, including any Food and Beverages in those areas.*

### SCHEDULE

#### Friday August 27

**16:00** Check-in begins (Front Desk – Professional Development Centre - open 24 hours)

**17:30-19:30** Dinner in the Vistas Main Dining Room, 4th floor, Sally Borden Building

**19:30** Informal gathering in 2nd floor lounge, Corbett Hall

Beverages and a small assortment of snacks are available in the lounge on a cash honor system.

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## **Saturday August 28**

- 7:00-9:00** Breakfast in the Vistas Main Dining Room, 4th floor, Sally Borden Building
- 9:00-9:30** Opening of the workshop and general discussion.
- 9:30-10:00** Thomas Ågotnes: Group Announcement Logic
- 10:00-10:30** Ken Satoh: Disjunction of causes and disjunctive cause: a solution to the paradox of *conditio sine qua non* using minimal abduction.
- 10:30-11:00** Coffee Break, 2nd floor lounge, Corbett Hall
- 11:00-11:30** Jim Delgrande: Horn Clause Contraction Functions: Belief Set and Belief Base Approaches
- 11:30-12:00** Giacomo Bonanno: Belief revision in dynamic games.
- 12:00-13:30** Lunch in the Vistas Main Dining Room, 4th floor, Sally Borden Building
- 13:30-14:00** Torsten Schaub: Answer set programming and belief change
- 14:00-14:30** Hans Rott: On the rationality of some allegedly irrational choices in decision making and defeasible reasoning.
- 14:30-15:00** Jeffrey Pelletier: Are all generics created equal?
- 15:00-15:30** Coffee Break, 2nd floor lounge, Corbett Hall
- 15:30-16:00** Bryan Renne: Multi-agent justification logic: communication and evidence elimination.
- 16:00-16:30** Daniel Eckert: Two sources of impossibility results for judgment aggregation.
- 16:30-17:00** Mehrdad Oveisi: Belief base change and dependence.
- 17:30-19:30** Dinner in the Vistas Main Dining Room, 4th floor, Sally Borden Building
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## **Sunday August 29**

- 7:00-9:00** Breakfast in the Vistas Main Dining Room, 4th floor, Sally Borden Building
- 9:00 – 10:00** Panel discussion
- 10:00-10:30** Coffee Break, 2nd floor lounge, Corbett Hall
- 10:30 – 11:30** Panel discussion
- Checkout by 12 noon.
- 12:00-13:30** Lunch in the Vistas Main Dining Room, 4th floor, Sally Borden Building

\*\* 2-day workshops are welcome to use BIRS facilities (2nd Floor Lounge, Max Bell Meeting Rooms, Reading Room) until 15:00 on Sunday, although participants are still required to checkout of the guest rooms by 12 noon. There is no coffee break service on Sunday afternoon, but self-serve coffee and tea are always available in the 2nd floor lounge, Corbett Hall. \*\*



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### ABSTRACTS

(in alphabetic order by speaker surname)

Speaker: Giacomo Bonanno

Title: Belief revision in dynamic games

Abstract: We provide a foundation for equilibrium concepts in dynamic (or extensive-form) games based on the AGM theory of belief revision (Alchourrón, Gärdenfors and Makinson, 1985). First we show that consistency with the AGM theory requires that the players' *ex ante* beliefs and disposition to change those beliefs be represented by a total pre-order of the set of histories, which we call "plausibility ordering". When an information set is reached, the player's revised beliefs are given by the set of most plausible histories among the ones that constitute this information set. Secondly, we use the plausibility ordering to provide a conceptually minimal definition of Perfect Bayesian equilibrium for general extensive-form games, which captures the idea of "applying Bayes' rule whenever possible" (on and off the equilibrium paths) and show that this basic notion of Perfect Bayesian equilibrium is a refinement of subgame-perfect equilibrium. Thirdly, we provide a qualitative characterization of the notion of consistency proposed by Kreps and Wilson (as part of the definition of sequential equilibrium) in terms of a property of the plausibility ordering. Finally, we highlight the qualitative content of the independence properties implied by sequential equilibrium and use these qualitative properties to define a strengthening of the basic notion of Perfect Bayesian equilibrium and show that it is implied by, but weaker than, sequential equilibrium.

Speaker: Thomas Agotnes (with Philippe Balbiani, Hans van Ditmarsch and Pablo Seban)

Title: Group Announcement Logic

Abstract: Group announcement logic (GAL) is an extension of public announcement logic with constructs (well known from coalition logic) of the form  $\langle G \rangle \phi$ , where  $G$  is a group of agents. In GAL, the meaning of  $\langle G \rangle \phi$  is that there exists an announcement that the members of  $G$  can jointly and truthfully make, and after that announcement is made public  $\phi$  will be true. GAL can be seen as a variant of arbitrary public announcement logic (APAL), where the quantification is restricted to formulae actually known by the members of  $G$ . I will discuss how GAL can be used to express properties such as "there is a sequence of truthful public announcements by agents in  $G$ , after which  $\phi$  is true", as well as interaction properties combining knowledge and ability such as the distinction between "agent  $i$  knows \*that\*  $\phi$  can be achieved by a public announcement" and "agent  $i$  knows \*how\*  $\phi$  can be achieved by a public announcement", and mention meta-logical properties such as axiomatisation, expressivity and the complexity of the model checking problem.

Speaker: Jim Delgrande (with Renata Wassermann)

Title: Horn Clause Contraction Functions: Belief Set and Belief Base Approaches

Abstract: Standard approaches to belief change assume that the underlying logic contains classical propositional logic. Recently there has been interest in investigating approaches to belief change, specifically contraction, in which the underlying logic is not as expressive as full propositional logic. In this paper we consider approaches to belief contraction in Horn knowledge bases. We develop two broad approaches for Horn contraction, corresponding to the two major approaches in belief change, based on Horn belief sets and Horn belief bases. We argue that previous approaches, which have taken Horn remainder sets as a starting point, have undesirable properties, and moreover that not all desirable Horn contraction functions are captured by these approaches. This is shown in part by examining model-theoretic considerations involving Horn contraction. For Horn belief set contraction, we develop an account based in terms of weak remainder sets. Maxichoice and partial meet Horn contraction is specified, along with a consideration of package contraction. Following this we consider Horn belief base contraction, in which the underlying knowledge base is not necessarily closed under the Horn consequence relation. Again, approaches to maxichoice and partial meet belief set contraction are developed. In all cases, constructions of the specific operators and sets of postulates are provided, and representation results are obtained. As well, we show that problems arising with earlier work are resolved by these approaches.

Speaker: Daniel Eckert

Title: Two sources of impossibility results for judgment aggregation

Abstract: It is well known that the literature on judgment aggregation inherits the impossibility results from the aggregation of preferences that it generalises. This is due to the fact that the typical judgment aggregation problem induces an ultrafilter on the set of individuals, as was shown in a model theoretic framework by Herzberg and Eckert (2009), generalising the Kirman-Sondermann correspondence and extending the methodology of Lauwers and Van Liedekerke (1995). In the case of a finite number of individuals, dictatorship then immediately follows from the principality of an ultrafilter on a finite set. This is not the case for an infinite set of individuals, where there exist free ultrafilters, as Fishburn already stressed in 1970. Following another line of Lauwers and Van Liedekerke's seminal paper, we show another source of impossibility results for free ultrafilters: The domain of an ultraproduct over a free ultrafilter extends the individual factor domains, such that the preservation of the truth value of some sentences by the aggregate model --- if this is as usual to be restricted to the original domain --- may again require the exclusion of free ultrafilters, leading to dictatorship once again.

Speaker: Hans Rott

Title: On the rationality of some allegedly irrational choices in decision making and defeasible reasoning

Abstract: In this talk I discuss a number of apparent anomalies in rational choice scenarios, and their translation into the logic of everyday reasoning. I consider three classes of examples that have been the subject of a vivid discussion in the context of probabilistic choice since the 1960s (by Debreu, Tversky and others). I recast them in a non-probabilistic setting, and show how they can at the same time be regarded as logical problems that concern the drawing of defeasible inferences from a given information base. I argue that initial appearances notwithstanding, these cases should not be classed as instances of irrationality in choice or reasoning. One way of explaining away their apparent oddity is to view certain aspects of these examples as making particular options salient. The decision problems in point can then be solved by 'picking' these options, although they could not have been 'chosen' in a principled way, due to ties or incomparabilities with alternative options. The talk extends and further develops the approach initiated in Rott (2001, 2004).

Speaker: Ken Satoh (with S. Tojo)

Title: Disjunction of Causes and Disjunctive Cause: a Solution to the Paradox of *Conditio Sine Qua Non* using Minimal Abduction

Abstract: We consider a problem of causality in legal reasoning. *conditio sine qua non* is a frequently used heuristics which determines a causality in legal reasoning. We show a paradox of *conditio sine qua non* derived from a confusion between disjunction of causes and disjunctive cause and give a logical solution to the paradox using minimal abduction.