CAUSATION
A Mini-workshop On Causation
Tuesday 8th July, 2pm
University of Birmingham

The room is booked from 2pm for three hours,
to allow extended discussion if people are interested.

Installed: 4 Jul 2014
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This document is
http://www.cs.bham.ac.uk/research/projects/cogaff/misc/causation-workshop.html

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Mini-Workshop On Causation 8th July

MOTIVATION

The concept of "cause" has been of interest to philosophers for centuries, but clarifying what that concept is remains problematic. Several web sites introducing philosophical theories and debates about causation are listed in http://www.cs.bham.ac.uk/research/projects/cogaff/misc/causation-background.html

Scientists aim to discover causes either for the advance of knowledge or for the sake of improved prevention and control, e.g. of diseases, crop failures, climate change, and other processes, or production of new phenomena, e.g. safe nuclear power sources.

Engineers, including civil, mechanical, electrical and computer engineers, make use of their understanding of causal mechanisms when designing new materials, machines or structures, extending old designs, or identifying and eliminating design flaws when things don't work as expected.

Psychologists and biologists investigate the understanding of causation and uses of causal reasoning in humans, including young children, also in other animals, while neuroscientists attempt to understand the causal powers of brain mechanisms that support those and other forms of reasoning and learning.

Roboticists concerned with producing intelligent machines need to understand how to give their robots the ability to discover and use causal relationships.

Computer scientists attempt to design new forms of computation and new formalisms making it possible for programmers and computer systems designers to produce machines with new sorts of causal powers, e.g. resistance to failures caused by hardware faults, and other forms of robustness.

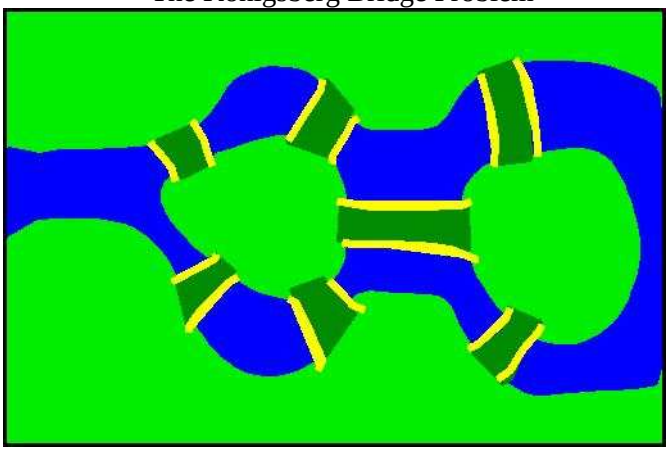
Can all these and researchers in other disciplines share their knowledge, and their puzzles, about causation, for mutual benefit?

Many non-philosophers have wondered about, or worried about, whether they can ever make decisions freely if everything that happens is caused, and, if not everything is caused, whether uncaused processes must be random and therefore not exercises of freedom.

David Hume (among others) challenged the claim that we have any clear notion of causation other than the notion of a learnt regularity that we use to predict what will come after some observed event or state of affairs. He suggested that the notion that there is something more than observed correlation, e.g. some necessary connection, is pure myth, and many contemporary philosophers think that the notion of an instance of a reliable correlation is the only concept of causation that we have.

Immanuel Kant, disagreeing with Hume, argued that the requirement that all concepts must ultimately be based on experience of instances would not allow any learning to get off the ground, since experience requires use of concepts. (He therefore disposed of what is now called "symbol grounding theory" in 1781.) He also claimed that in order to think about a kind of reality that exists independently of our perceiving it, we need to assume a kind of causal necessity that is stronger than mere experienced regularity, as a feature of that reality. Kant's claim can be illustrated using examples of events that have mathematical consequences. These are situations in which a change in certain properties or relationships necessitates changes in other properties and relationships.

The Konigsberg Bridge Problem



The configuration of seven bridges linking two islands in the river and the surrounding town causes the impossibility of traversing all the bridges in a single tour, without crossing any bridge twice. Convince yourself that it is impossible, and that either adding or removing a bridge will cause a tour traversing every bridge to become possible. Does it matter what material the bridges are made of? See the Wikipedia entry.

Can a baby learn to reason mathematically about the effects of rotating one rigid impenetrable gear wheel meshed with another?

That Kantian "necessary connection" view contrasts with a modern variant of the Humean "mere observed regularity" view. This modern variant uses a notion of "possible world", and relationships between possible worlds. So our complete universe as it is, past present and future, is one possible world, but there are other possible worlds in which different things happen or exist. In this framework (Possible worlds semantics) talk of causal connections is interpreted as referring not only to observed regularities but to regularities that would have been preserved even if different initial states or surrounding circumstances had existed. So on this neo-Humean analysis the truth of A caused B depends on whether B would or would not have occurred in other possible worlds in which A does occur and other possible worlds in which A does not occur.

In contrast, a "power" theory of causation claims that the possible worlds story (which may or may not be coherent, depending on what sort of things possible worlds are supposed to be) does not explain what causation *is*. It merely summarises some of the *consequences* of causal relationships. These debates have implications both for theories about how causal understanding works in humans, and other animals and how it will need to work in future intelligent machines. But also implications for what the universe needs to be like for causal connections to be able to exist. There are different variants of the "power" theory.

One of the reasons for inviting computer scientists and roboticists to this meeting is that there are interesting problems about causation in virtual machines, and problems about how intelligent machines need to understand causation, both in themselves, and in their environments.

For more on theories about causation see this background document:
http://www.cs.bham.ac.uk/research/projects/cogaff/misc/causation-background.html
[TO BE EXPANDED]

This Mini-Workshop

This is a modest attempt to explore some ideas about the nature of causation triggered by the fact that Andrea Raimondi a philosophy student with a software engineering background, who studies causation at Nottingham University, will be visiting the School of Computer Science on Tuesday 8th July. He has agreed to present some of his ideas about what causation is. An outline of those ideas about causal powers is available here.

To kick off the workshop, Aaron Sloman, a philosopher in the Birmingham School of Computer Science will give an introductory talk providing some of the philosophical background for members of the audience who are not philosophers. Some of the background is expanded here (work in progress) and includes some challenges to over simple theories of causation, from computer science and from mathematics.

After the introduction Andrea Raimondi, Philosophy Dept, University of Nottingham
http://about.me/Raimondiand
will give a talk on causation and powers. For more information on his talk see this overview.

Alastair Wilson, a philosopher of science in the Birmingham University department of philosophy has agreed to introduce the discussion following Andrea's. presentation (after a break). Information about him is here:
http://www.birmingham.ac.uk/staff/profiles/philosophy/wilson-alastair.aspx

Alex Silk, also in the department of philosophy hopes to attend, and will also be given an opportunity to comment from the point of view of a philosopher interested in semantics and modality. Information about him is here:
http://www.birmingham.ac.uk/staff/profiles/philosophy/silk-alex.aspx

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Approximate Schedule:
(All times are approximate.)

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A: 2pm
Aaron Sloman
Computer Science, University of Birmingham
http://www.cs.bham.ac.uk/~axs
Welcome, introduce participants,
Introduce workshop:
Present some of the "standard" Philosophical background, extended with examples
of "computational causation" (e.g. causation in virtual machines composed of
multiple asynchronously interacting virtual machines) and "mathematical
causation" (e.g. moving a vertex of a planar triangle further from the opposite
side causes the area to be increased, adding three marbles to a box containing
five marbles causes the number of marbles to go up to eight, changing the
curvature of a line causes infinitely many distances between parts
of the line to change.
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B: 2:25-2:35
Questions discussion and clarification, mainly for the benefit of non-philosophers present.
Objections/counter proposals postponed until after the following talks.

D: 2:35
Andrea Raimondi,
Philosophy Dept, University of Nottingham
http://about.me/Raimondiand

What is Causation?

Abstract
"Metaphysics of powers offer an alternative approach to the problem of causation. It is argued that this approach, causal dispositionalism, is explanatory of the behaviour of biological systems and artefact in terms of their causal production. This behaviour is a function of selection between natural possibilities that powers support and constrain."
Extended summary

E: 3:30
15 Minute Refreshment Break
(Hot and cold drinks and snacks available in machines in basement.)

F: 3:45
Comments from Alastair Wilson
http://www.birmingham.ac.uk/staff/profiles/philosophy/wilson-alastair.aspx
Philosophy Department, University of Birmingham

G: Discussion, possibly including comments by Alex Silk.

H: Close (When appropriate -- room booked till 5pm)

Maintained by Aaron Sloman
School of Computer Science
The University of Birmingham