6 Extensions, open problems, and the bright side of life

6.1 Premise Sets Originally Considered as Irrelevant

A researcher often tries to solve a problem from a given theory and/or a given data set and/or a given set of methodological does and don'ts (here often a given logic!), and later finds out that (s)he has to broaden this background.

One tries to answer $?\{Pa, {\sim}Pa\}$ from a theory T. This fails, but the prospective dynamics leads to the following situation:

T warrants that $?\{Pa, {\sim}Pa\}$ is answered by Pa if Qa is the case.

To find out whether Qa, one needs to rely on a theory T'.

example: solving a physiological problem may require chemistry, etc.

Which theory has to be invoked will be revealed by the derived problems.

Result: premise set is extended.
(= simple, but provoked by the prospective dynamics)

6.2 Questions Evoked by Steps in the Psp

Consider the following fragment of an example from lecture 4:

1	$(Pa \wedge \sim Qa) \wedge \sim Ra$	PREM	$\emptyset$
2	$\sim Pb \wedge (Qb \wedge Rb)$	PREM	$\emptyset$
3	$Pc \wedge Rc$	PREM	$\emptyset$
4	$Qd \wedge \sim Pe$	PREM	$\emptyset$
...			
11^{L17}	$(\forall x)(Px \supset \sim Qx)$	1; RC	$\{Px \supset \sim Qx\}$
12^{L17}	$\sim Qc$	3, 11; RU	$\{Px \supset \sim Qx\}$
13^{L17}	$(\forall x)(Rx \supset Qx)$	2; RC	$\{Rx \supset Qx\}$
14^{L17}	Qc	3, 13; RU	$\{Rx \supset Qx\}$
15	$(\exists x)\sim(Px \supset \sim Qx) \vee (\exists x)\sim(Rx \supset Qx)$	3; RU	$\emptyset$
16	$(\exists x)(Px \supset \sim Qx) \wedge (\exists x)(Rx \supset Qx)$	1, 2; RU	$\emptyset$
17	$!(Px \supset \sim Qx) \vee !(Rx \supset Qx)$	15, 16; RU	$\emptyset$

line 17 evokes the question $?\{!(Px \supset \sim Qx), !(Rx \supset Qx)\}$

As abnormalities are presumed to be false unless and until proven otherwise, it is natural to consider first and foremost questions evoked by $\boldsymbol{Dab}$-formulas.

Abnormalities are seen as 'abnormal', 'problematic', . . .

Some other disjunctions also evoke sensible questions.

The fact that $\forall \boldsymbol{A}$ is derived on the condition $\boldsymbol{\Delta}$ evokes the question $?\{\forall \boldsymbol{A}, \boldsymbol{Dab}(\boldsymbol{\Delta})\}$.

This implies $?\{\forall \boldsymbol{A}, {\sim}\forall \boldsymbol{A}\}$, which implies questions about instances of $\boldsymbol{A}$, as well as $?\{\boldsymbol{Dab}(\boldsymbol{\Delta}), {\sim}\boldsymbol{Dab}(\boldsymbol{\Delta})\}$ (which has only one sensible target).

6.3 Tests

Often a question can be turned into a test, i.e. can be answered by observation or experiment.

Thus the question $?\{!(Px \supset {\sim}Qx), !(Rx \supset Qx)\}$ erotetically implies $?\{Qc, {\sim}Qc\}$.

In view of the premises, this is an extremely sensible question: any answer will at once lead to one of the disjuncts of

$$!(Px \supset {\sim}Qx) \vee !(Rx \supset Qx)$$

and hence 'free the other disjunct from suspicion'.

If the answer is, for example, Qc,
then $(\exists x)(Px \supset {\sim}Qx) \wedge (\exists x){\sim}(Px \supset {\sim}Qx)$ is derivable and hence lines 13 and 14 are unmarked when the outcome of the test is added as a new premise.

▼

1	$(Pa \wedge \sim Qa) \wedge \sim Ra$	PREM	$\emptyset$
2	$\sim Pb \wedge (Qb \wedge Rb)$	PREM	$\emptyset$
3	$Pc \wedge Rc$	PREM	$\emptyset$
4	$Qd \wedge \sim Pe$	PREM	$\emptyset$
...			
11^{L17}	$(\forall x)(Px \supset \sim Qx)$	1; RC	$\{Px \supset \sim Qx\}$
12^{L17}	$\sim Qc$	3, 11; RU	$\{Px \supset \sim Qx\}$
13	$(\forall x)(Rx \supset Qx)$	2; RC	$\{Rx \supset Qx\}$
14	Qc	3, 13; RU	$\{Rx \supset Qx\}$
15	$(\exists x)\sim(Px \supset \sim Qx) \vee (\exists x)\sim(Rx \supset Qx)$	3; RU	$\emptyset$
16	$(\exists x)(Px \supset \sim Qx) \wedge (\exists x)(Rx \supset Qx)$	1, 2; RU	$\emptyset$
17	$!(Px \supset \sim Qx) \vee !(Rx \supset Qx)$	15, 16; RU	$\emptyset$
18	Qc	New	$\emptyset$
19	$(\exists x)(Px \supset \sim Qx) \wedge (\exists x)\sim(Px \supset \sim Qx)$	1, 2; RU	$\emptyset$

The formula of 19 is the only relevant minimal Dab-formula in the proof.

psps evoke tests that lead to the rejection of some generalizations and the derivability of others

6.4 Narrowing Down Suspicion: Conjectures

▼

A researcher may have reasons (personal constraints, . . . —see lecture 1) to deny certain abnormalities. For example $\sim!(Rx \supset Qx)$.

$\sim(\exists A \wedge \exists\sim A)$ is $\mathbf{CL}$-equivalent to $\forall A \vee \forall\sim A$.

Abnormalities should be denied in a defeasible way.

Defeasible conjectures are better prioritized: $\Diamond A_1$, $\Diamond\Diamond A_1$, . . .

These are handled by a well-studied adaptive logic that first avoids (whenever possible) $\sim A \wedge \Diamond A$, next avoids (whenever possible) $\sim A \wedge \Diamond\Diamond A$, etc. (see 4.8)

Tests and conjectures lead only to apparently the same results (as it should be!)

6.6 More On Combined Contextual Psps

▼

It is one thing to answer a why-question from a theory $\boldsymbol{T}$ (Hintikka), and another thing to find out (relying on *other* knowledge) whether a potential explanation is indeed a true explanation.

Step 1: find a potential explanation by the prospective dynamics relying on $\boldsymbol{T}$.

Step 2: find out whether this explanation is true.

6.7 Changing the Logic

Example:

If trying to explain $\boldsymbol{Pa}$ from $\boldsymbol{T}$ fails,
no suggested extension of the data offers a way out,
and no other available theory offers a way out,
one may move to $\mathbf{IL}$ to extend $\boldsymbol{T}$ by some generalization that, together with the data, explains $\boldsymbol{Pa}$.

$=$ move from $\mathbf{CL}$ to $\mathbf{IL}$

6.8 The Bright Side of Life

The dynamics of the programme suggests that a pragmatic approach (solve what is possible and hope for more) is justified.

Further extensions are apparently within reach.
Also outside scientific problem solving.

Lots of applications still have to be worked out. Similarly for some technical stuff.