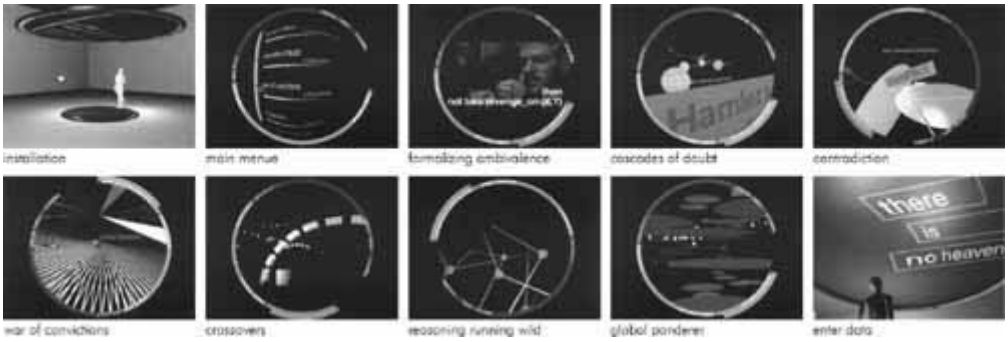
Daniela Alina Plewe
Ultima Ratio



Software and Interactive Installation

*C*onflicts from real life and literature are reduced to their logical structures in order to process them in several functional and dysfunctional modes. To do this, a decision-support system from the field of AI has been implemented and modified, which permits those conflicts to be remodeled as pro and contra argumentations. The logical processes are displayed in realtime visualization as moving 3-D diagrams which simultaneously serve as interfaces. In the installation, this animation is projected onto an overhead disk. The images follow the observer's glimpse by means of a head/eye tracker, whereby the diagrams are distorted in accordance with the observer's ever-changing perspective. A chorus of computerized voices provides a recitation of the dispute thus generated.

Ambivalence

Aesthetic experience is often the experience of contradictions. We encounter dilemmas, paradoxes or other forms of ambivalence in works of art, and we are all familiar with the figure of the literary hero who — in an aporetic situation — must make his tragic choice.

Pro and Contra

Ultima Ratio is based on a formalism which permits ambivalences to be represented in the form of argumentations. In contrast to classical logics, several new varieties of formalism developed by Artificial Intelligence research tolerate inconsistencies and, for example, also permit exceptions to rules.

Formalized Conflicts

Bits of information presented in the form of arguments are no longer just casually arrayed alongside each other, but rather enable an automatic process of evaluation. The logical core of Ultima Ratio accesses a databank in which various types of — primarily literary — conflicts are stored as logical reconstructions. Installation visitors can expand this databank with new arguments, counterarguments, facts, and assumptions. The formalization of conflicts encompasses their interpretation and the explication of intuitions.

Should Hamlet Kill Claudius?

Yes, since he wants to take revenge on Claudius who murdered Hamlet's father. No, because he believes that someone who is killed while praying goes to heaven. Fact: Claudius is

praying. Therefore, do not kill him. What if Hamlet senses atheistic doubt (heaven?) in himself? Then yes, kill him.

Shakespeare, Hamlet Act 3, Scene 3

Hamlet. [approaches the entry to the lobby]

Now might I do it pat, now a' is a-praying -

Fact: praying(claudius)

And now I do 't, [he draws his sword] and so a' goes to heaven,

Rule: in_heaven(Y) <- kills(Y,X), praying (Y)

And so am I revenged. That would be scanned:

Rule: take_revenge_on(X,Y) <- kills(X,Y)

A villain kills my father, and for that

Fact: killed(claudius,king)

I his sole son do this same villain send

To heaven …

Why, this is bait and salary, not revenge.

Rule: - take_revenge_on(X,Y) <- in_heaven(Y)

X wants to take revenge on Y if Y killed a person Z being close to X, and the killing is not justified.

Rule: goal_revenge(X,Y), <-

close(X,Z,), killed(Y,Z), not justified (killed(Y,Z))

Hamlet and his father are close to each other.

Fact: close(hamlet, king)

There is a conflict, if somebody wants to take revenge and can't.

Conflict: + <- goal_revenge(X,Y), not take_revenge_on(X,Y)

"Hamlet killing Claudius" is assumed false, but this may be changed in the mode "remove conflict".

Assumption: revisable(kills(hamlet,claudius),false)

Decision-making

Several rational principles underlying the human decision-making process are implemented in the logical core of Ultima Ratio. For instance: don’t believe a statement if its opposite is true; don’t draw conclusions from defeated information, etc. With the help of these overriding deductive rules, the system can now carry out logical operations. This inherently rational

deductive engine is used to produce various functionalities and dysfunctionalities, all of which provide commentary on the line of argumentation as a method of dealing with conflicts.

Functional and Dysfunctional Modes

Cascades of Doubt — Struggling Agents

reconstructs the internal monologues of the heroes (or agents). With "change agent," users can influence these characters by changing the rules and assumptions which form the basis of the heroes' beliefs. "Change world" revises the facts from which the program derives conclusions and generates logical alternatives to the original scenarios. "Remove conflict" offers suggestions as to how some conflicts could be avoided, in that other assumptions about the world are accepted as true statements.

War of Convictions — Arguments as Forces

elaborates arguments as forces operating among and between particles of knowledge. (This feature can be expanded to a multi-agent scenario.) The visitor selects a conflict from the databank, and the system provides him with the relevant arguments.

Crossovers — Tracing Motifs

connects various plots and contexts according to their dramaturgical motifs. When rules occur in several contexts, the system creates a link between them and generates synthetic characters. Thus, the revenge-rule from "Hamlet" can lead to "Medea," in which a rival-rule comes into play just as it does in "Casablanca."

Reasoning Running Wild Counterarguments Forever Everywhere

illustrates the omnipresence of possible doubts.

Inversions — Negations with Negations

serves up logical Dada with inverted facts and rules. Does the complement of a logical inference also encompass the irrational?

Modelling Virtues — Modifying Tools of Life

Various human qualities, mental states and dispositions are interpreted in the framework of formalism and can be brought up on screen. Courage = live wrong, but win. Despair = navigation in a reluctant environment.

Gobal Ponderer — Continuous Automatic Reasoning

If the visitor does not wish to intervene, he may observe *Ultima Ratio* run its course on its own through the domain of ambivalence.

Mental Spaces

The "logical stories" of the deductive engine are visualized as 3-D diagrams in a virtual space. Arguments appear as fragile, abstract constructions in which premises and conclusions take

shape as geometric forms. Balance, gravitation and other effects illustrate the dynamics of argument and counterargument. The process of drawing conclusions corresponds to a movement through virtual space.

Passively Interactive

A generated navigational path conducts the visitor through the abstract landscape. If he wishes to access more or different information, he may navigate independently. The "guided tour" is available to the visitor at all times.

Abstraction

Using a model in the shape of nested spheres, information surrounding a central contradiction is arranged outward in successive layers. The inner levels present specific information such as video sequences, graphics, or original texts. Outside of them appear the abstract, logical formulas employing variables instead of individual names. The inner levels convey operational flow information such as "attack, defend, check exception, conflict" to the outer levels, in which only the structure of the argumentation is discernible. Which representation the viewer sees depends on his virtual distance to the contradiction.

selfcentered Visitor

The interactive installation’s images are projected from above onto a round disk suspended from the ceiling, below which the visitor stands. An eyetracker (or headtracker) registers the viewer’s line of sight; this allows the visualization software to calculate the viewer’s moving point of view and to deform the visualizations in accordance with that perspective. Thus, the viewer becomes the totally egocentric subject, whereby the intentionality of his view (or the direction in which his head is pointing) serves as a metaphor for the intentionality of his thinking.

Between Silence and Scream

A chorus of text-to-speech synthesizers recites the argumentations as a polylogue. The accentuation, tonal coloration, and rhythm of the superimposed voices reflect the logical structures. The argumentation oscillates between silence and screaming — both extremes can be heard.

Wisdom and Despair

When human beings confront the dynamics of argument and counterargument, the outcome can be a refinement of knowledge (science, wisdom) or it can result in despair. On the other hand, a computer program — free from any obligation to act in the real world — can reason endlessly.

A prototype of the software will be demonstrated at the Ars Electronica Festival.

Concept, Visualization, Interfaces, Production: Daniela Alina Plewe, Logic Programming: Michael Schroeder (City University, London), Uwe Küssner (KIT Project, TU Berlin)

Computer Linguistics: Manfred Stede (KIT Project, TU Berlin), Visualization Software: Andreas Raab, Bela Bargel, Joachim Boettger (Department of Simulation and Graphics, University of Magdeburg), Sound: Florian Reifenberg, Wolfgang von Schweinitz, Thomax Kaulmann, Demo Stills (b/w): Stefan Gandl, Softimage

Operation for Demo Animation: Dirk Weinreich, Tristan Thönnissen, Jens Eidinger, Martin Dahlhauser, Pik You Chan, Tilo Meisel

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