

WORKING WITH JAN IN FOUR MOVEMENTS

I feel that I just met Jan van Eijck yesterday, in the turbulent revolutionary Groningen of 1976 – but now, the editors of this festschrift are telling me that I have not kept track of time, and that we live 40 years later, our long hairs gone, close to retirement. Academic life is a sheltered cave. We Dutch are all Rip van Winkles if it comes to it.

Over those years, Jan turned from a student into a colleague, ally, and friend whose vigor and continued growth kept impressing me. I could write about his dissertation on quantifiers, his work on natural logic in natural language, his record in computational semantics and computational logic, in dynamic-epistemic logics, or in broad social software. I could write about his didactic gifts, leading to a string of textbooks, all the way to our most recent collaboration on the internet course “Logic in Action”. I could write about his broad intellectual interests, from general philosophy where he wrote a widely used and often reprinted textbook in his early years to the austere world of computer programming in his mature period. I could write about his stylistic talents, from technical papers to engaging public dialogues. And finally, I could write about his leadership in the national research program ‘Semantic Parallels in Natural Language and Computation’, the Education team of my Spinoza Award project, or the ‘Games, Action and Social Software’ project at the Netherlands Institute for Advanced Studies NIAS. And all this from someone who, when I first met him, sported a luxuriant black hair style presaging Marx and Engels rather than Hilbert and Gödel.

This string of laudatory modalities is not just my own personal view, or that of a local circle. Even Jan’s relatively short foreign stays left their traces. Just a few years ago I met the somewhat intimidating CEO of a well-known internet start-up in San Francisco who became positively warm and jubilant the moment Jan’s name came up. They had worked together in Cambridge, and his appreciation had stayed ever since.

But for this festschrift, I want to look at something else, namely, the public record of my collaborations with Jan. What did we write together, and what became of it?

The first paper we wrote, called ‘The Dynamics of Interpretation’, appeared in 1982 as the first item in the first volume of the new *Journal of Semantics*. ‘Dynamics’ is a popular term these days (it may already be past its prime, as youth turns into cliché), but we may have been among the first to use it. By that time, classical Montague Grammar was challenged by new richer semantic frameworks for natural language, and these frameworks were busy developing content and attracting followers. Instead of adding one more, Jan and I wanted to understand what was going on. In the paper, we mention a conference in Cleves that brought together leading innovators of the time like Jaakko Hintikka and Hans Kamp, but also, in another tradition, Pieter Seuren. In our paper, we try to bring logical clarity to these approaches, including then current views of discourse representations as schematic pictures of the real world and connections with semantic tableaux, and we explore consequences for logical theory. Specifically, we show that a picture metaphor can only work for a small existential fragment of a language: in more modern terms, the domain of model-checking methods for inference in knowledge representation. We also analyze to which extent semantic tableaux can be viewed as generalized pictures, with not just individual facts but also rules, and prove in which precise sense tableaux manipulate open branches as schematic representations of (classes of) standard models. Finally, we question the conservative tendency of much semantic innovation at the time of insisting on tight connections with complete classical models, and suggest that a more radical approach would just stick with partial models as one’s semantic universe.

Looking back at these themes, we were too early. Pictures and diagrams as a vehicle for reasoning only became a big topic in the 1990s, and partial possibilities semantics in its own right did not sweep the world, although it is making a comeback these years. Moreover, we made a tactical mistake in giving an extensive comparison between Hintikka’s game-theoretic semantics and Kamp’s discourse representation theory and suggesting that these frameworks could learn from each other. This is of course anathema to founders of new religions that are on the march.

Despite this irenic tendency, there are also striking critical undertones in the paper. For instance, on the status of representations, we write “some view them as syntactic constructs, some as psychological ones, and some just prefer to remain confused on this issue.” Nowadays, several decades later, I would never write anything like that, having learnt to sugarcoat criticism for thin academic skins, suppress emotion, count to 10, 100 or whatever power of 10 it takes, and realizing that every ironical remark will come back to haunt you. But oh my, how I enjoy the barbs in this paper!

All in all, I believe that methodological clarity and a cooperative stance are crucial for a healthy field: but one can overdo it. Competition between schools, including unfair propaganda, may well be a prime mover that we should not stifle.

Are there still things to think about for Jan and me? Our paper is about the dynamics of interpretation, not about dynamifying meanings, and this distinction in locus for capturing the dynamics of language use still seems relevant. I wonder what Jan thinks about it, decades later, as a much more experienced computational semanticist.

In the 1980s, our interests turned from natural language by itself to include action and computation in general. Computer science became a new source of inspiration, in its fast development of new paradigms for sequential and parallel computation. This fit is natural given the many parallels between the study of language and computation, a trademark item at the ILLC. Our second paper came some ten years later, written with Vera Stebletsova from Moscow. Again, our goal was comparative and systematic. We contribute to connecting two realms that were already interacting: the tradition of labeled transition systems in computer science, in particular, process algebra, and poly-modal and dynamic logic over relational models. We give a general perspective on the proliferation of process equivalences at the time in terms of matching logical languages, showing how classical results on definability go through. Going beyond that, we introduce the notion of safety for bisimulation, a logical take on program or process operations that fit a chosen invariance notion – though a full first-order characterization theorem came only later in the 1990s. And finally, we take parallel processing seriously by proposing a new notion of bisimulation for concurrent PDL.

I could say more (the paper is 45 pages long), but these points are of course mainstream by now. Computer science and modal logic have drawn ever closer, and qua methods, the paper is typical Amsterdam School in its emphasis on model theory as a source of generality. So, no story of unjust neglect here: we were just helping build a highway, and the computer science influence stayed in our own later work.

An open end for Jan to ponder today is our treatment of concurrency. Modeling parallel action is a very live issue – unless you think your religion has solved it all (sects also abound at the interface of logic and CS). With some colleagues, I am puzzling over natural bisimulations for games these days, and questions from our paper return.

But Jan and I did not always just streamline what was already happening: we also ventured into new territory. In a 1993 report ‘Changing Preferences’, written together with Alla Frolova from Moscow (again a Russian logician, the Moscow connection was strong in those days), we point out how, in addition to action and information, preference is crucial to agency. True to form, we then propose a general logic of order minimization for analyzing various notions of consequence proposed at the time in AI and semantics of natural language, that combined information and preference (be it as the rather bleak notion of what would nowadays be called relative plausibility). We show how many further notions of consequence can be defined in our framework demonstrating the free spirit that comes with logical abstraction. There is also an extensive discussion of dynamics of new information, and of technical translations for laws of dynamic scenarios into the language of static logics, in the spirit of things Jan and I were doing separately at the time for systems of dynamic semantics.

Again, this sort of approach is mainstream by now. However, the period is pre-DEL, and the technique of the paper is the one we used back then, inspired by the work of Edsger Dijkstra, the only Dutch winner of the Turing Award to date. We use transformations of propositions as sets of worlds, connecting pre- and postconditions recursively. Nowadays this would be seen as a ‘lifted version’ of DEL-style update, I guess, though the proposition-transformer approach is more general in principle – and it did

feature prominently in the work of our joint student Marc Pauly. It is a long time since I have discussed this methodological shift with Jan, and I sometimes wonder why we gave up the Old Way (or did it just happen?). Of course, there must be an answer, since we are talking logic and mathematics, and if there is one, Jan is sure to have it.

But to me the most striking part of the report comes toward the end. We propose two operations that change preference order, that would nowadays be called 'suggestion' and 'radical upgrade', and suggest that these are central notions to study. But we did not. We did not even publish this paper. Why? Perhaps the reason can be found at the start of the paper: we apologize for taking preference seriously, as being subjective and fleeting (a shallow objection one still finds in some circles today). This was a mistake. Only some 10 years later, preference became crucial to my own work on logic and games, and I am sure that Jan, too, has seen the light. And our operations for preference change turned out to be central to the creation of dynamic-epistemic preference logic in the work of Fenrong Liu around 2006. So, we missed our chance.

But to those who stay afloat, the great stream of research always carries fresh opportunities. The emergence of dynamic-epistemic logic in our community around 2000 affected us deeply, as it was an ideal vehicle for pursuing the dynamic and computational themes that had been there in our work from the start. Here, too, a modeling challenge plus a search for systematization combined to produce my final example, the 2006 paper 'Logics of Communication and Change', written with Barteld Kooi.

This paper arose from the needs of group knowledge, and in particular, finding the right recursion laws for common knowledge after update. I had already found one solution for the special case of public announcement logic: extending the base logic with conditional common knowledge, and next, with Barteld, I had found a solution for the much harder case of DEL product update in terms of finite product automata. However, joining forces with Jan made us see the power and elegance of making two further changes in the set up: working with an epistemic version of propositional dynamic logic in the base, and using a beautiful algorithm for finding recursion laws based on the proof of Kleene's Theorem for finite automata. In addition, we showed

how factual change can be taken on board in DEL, as long as it can be modeled by changing truth values for proposition letters according to some definable recipe.

I believe that this is still about the most elegant formulation of DEL in its generality, though some friends feel we either did too much (the base language becomes hyper-baroque) or too little (we did not arrive at generalized dynamics in the style of Girard, Liu & Seligman, and we did not cover the modal mu-calculus, something I did later with Daisuke Ikegami). I do not think our paper got the attention it deserved, and in fact, in the years since 2006, I have seen many publications on DEL reinventing the wheel (or even worse, square or polygonal versions thereof) that do not seem to be improvements. However, truth is a slow but sure traveler, and our time will come.

That does not mean that our paper is the last word: the road goes on. Right now, I am interested in fixpoint logics where DEL programs can be defined by recursion (for cognoscenti: the way things happened in PAL*), and then we need to spring the bounds of all this. However, these logics are highly complex computationally, at least in their current versions, so I am not sure if the programmer in Jan will approve.

These four papers show what working with Jan van Eijck produces. I believe that their methodology and content are still alive, with new questions if you add up all asides in the above. But the process was as pleasant as the product. Here are some qualities one experiences when working with Jan. He likes to be broadly informed across a topic, and then shed light by seeing patterns across notions, results, and schools. He likes to ascend to well-tested logical abstraction levels where things become clear and comparable, rather than engage in ad-hoc modeling. And in his approach to both ideas and the people creating them, he tends toward generosity, and collaboration.

Of course, Jan also has habits that are more alien to me, such as his insistence on practical programming skills. These are like prowess in jogging: I admire people who do it, but I find it hard to follow. But I do marvel at how the programmer in Jan turns abstract logic into concrete methods, say, when he computed recursion laws for difficult communication scenarios that I could never keep straight with just brain power.

And I have seen with my own eyes how adding programming to logic courses, another recommendation of his, can turn hostile mobs into engaged students.

Jan's academic road has many more milestones than the four I have placed in this short piece, but I am sure that this festschrift in total will reveal a long scenic road.

It will be clear that Jan and I have been travel companions for a long time. There are many more personal things one could say about success and failure, hope and fear. But not everything that is announced is valuable, and not everything that is valuable should be announced. I wish Jan all the best with designing a meaningful life beyond retirement, avoiding the trap he dreads of 'more of the same'. Now is the time!

References

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