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Video recording and documentation of the performing arts: from the annotation to the visualization of metadata, the example of the Rekall software.

Clarisse Bardiot

Abstract

From the mid 2000s, an increasing number of initiatives have explored the digitization of live performance collections. Generally these initiatives focus mainly on video recording, the most “spectacular” and easily approachable components of performance archives. Yet, it may seem simplistic to suggest the webcasting of video recordings, in whole or in part, in the midst of the possibilities offered by semantic web technologies and metadata. What are the benefits of digital technologies over the more conventional documentary method that has now become video recording? We will demonstrate how one answer lies in video recording annotation. Far from being univocal, video recording annotation has brought forward multiple approaches in the field of the performing arts. We will outline key experiments on the subject, including those led by William Forsythe, whose work has transformed video recordings from heritage materials to being a generator of digital arts, in the perspective of capturing choreography. Using Rekall software (currently under development), the goal is to expand the video annotation model to reach out to new visual possibilities of displaying the metadata underlying a heterogeneous corpus of documents associated with the same performance.

Keywords (5-6)

Video recording, performing arts documentation, annotation, data visualisation, metadata

Digital technologies and the performing arts have at least one thing in common: their outputs, documents for the former and performances for the latter, are both ephemeral. The perspective of a “Digital Dark Age”, or a digital oblivion or generalized amnesia in the contemporary memory, meets the fleeting and fickle nature of live performances. In the introduction of their book *Re-collection* (on the conservation of new media art) John Ippolito and Richard Rinehart highlight the kinship between the performing and digital arts: “New media art is as performative and variable as it is visual or artifactual. That is, new media art can be seen to be as much a performing art like music or theatre as it is a visual art like painting or sculpture” (Rinehart & Ippolito, 2014, p. 25). In respect to the memory of the performing arts, digital technologies raise different questions: How to appropriate archives, and how to memorize a flow within a corpus of documents? What is the benefit of archiving over other approaches such as video recording or notation? What should be the status of digital documents generated during the creative process? How to document the technological devices used during a performance, such as those used for sound and light management? In other words: how do digital technologies contribute to remembering the performing arts? Answering these questions is no small undertaking, and many experiments are underway to explore the answers, most based on the video recording of performances, which can be digitally annotated. The multiple ways of approaching the annotation of video recording reflects a far from univocal rapport to archives and documents. First, I will outline the main approaches through a state of the art analysis (which does not purport to be complete) on video annotation in the field of the performing arts. Then, I will introduce my current project: Rekall, an open source environment for documenting and analysing staging processes and simplifying the re-staging of performances. The software’s design is particularly reliant on video recording annotation technologies.

From the distribution to the annotation of video recording

The video recording of performances has long been, and remains, considered a panacea for the documentation of ephemeral performance arts. The ability to make video recordings of performances has indeed brought significant changes to the documentation of the performing arts. Used on a small or larger scale from the introduction of the first video cameras since the 1960s, sometimes systematically in a number of theatre houses, video recording provides visually static and dynamic tracks of a half century of the performing arts – sometimes more with movie recording. The tracks can be collected by a “witness” camera recording the performance, in whole or in part, from the back of the room, or the video recording is intricately processed and edited (multi camera shooting, original remodelled production, etc.), up to the production of made-for-TV, and now for webcast or streaming, “performance movies”. The Franco-German television station Arte has created an internet streaming site, Arte Live Web, specifically dedicated to live performances. Furthermore, many performers have made video capturing the cornerstone of their creative process, as illustrated notebooks: based on the various artistic processes, filmed rehearsals can be viewed, analysed, remounted and become the framework for each next rehearsal until the premiere, and sometimes during a tour. At a later stage, these documents are used by researchers interested in the genetic analysis of the artistic process.

Video recordings, often considered as one of the most important tracks of earlier performances, are often at the heart of performance archive digitization and broadcasting programmes. Indeed, the French website numeridanse.tv, an “international online dance video library” launched in 2011 (“Numeridanse.tv,” n.d.) is a collective project resulting from the national digitization plan of the French Department of Culture and Communication. It connects choreographic centres in France and abroad, as well as institutions holding dance

collections. Numeridanse.tv is comprised of a database containing video recordings of dance performances, along with supporting text. As indicated by the .tv extension, the website is inspired by a televisual model, although future developments identify “web documentaries”. Another French initiative worth noting is the acquisition by the Institut National de l’Audiovisuel (INA) of the audiovisual archives of four national theatre houses (Chaillot, Odéon, La Colline, Strasbourg), of the Conservatoire National d’Art Dramatique, and of other theatre and opera houses, adding up to an exceptional collection of performance recordings (and of interview recordings and other documents) from the 1950s to today. In September 2013, part of these digitized materials were included on *En scènes* (“En Scènes,” 2013), a website dedicated to live performances. Working as an “interactive encyclopaedia of live performances”, the site contains excerpts and entire movies, supported by their contextual and descriptive information. Thematic browsing enables the exploration of specific genres, time periods, region or subject matter, while the split-screen option is adapted to the simultaneous viewing of the video recording and associated written commentary. The New York Public Library recently implemented a similar system on a much broader scale. Currently in its beta version, the NYPL Digital Collections project (“NYPL Digital Collections,” n.d.), is a video collection of live performances, including the Jerome Robbins Dance Division Moving Image Archive. An annotation tool enables the inclusion of text and the comparison of multiple videos. All operations are executed directly on the Web browser and may be saved for future use.

Both *En Scènes* and the NYPL Digital Collections project exemplify the emerging interest in the annotation of video recordings of live performances. Annotations, the written, graphic or audio commentary parallel to the capture to provide supporting information, differs from notation, or the representation, transcription or recording, in written signs or conventional symbols, of a choreography or music. The product of notation could be a musical score, which would not systematically be the case with annotation. There may always be overlap between annotation and notation, and the line between the two is often blurry. Video recording is not the visual representation of a musical score, it is rarely self-sufficient and requires commentary, analysis, further deciphering. With dance, but also with other performing arts, the performer’s corporal memory, as an actual “living archive” is considered as a fundamental aspect of performance memory (Benichou, 2014). Beyond the fascination for a document that appears to contain the essence of the performance, and to be its clearest trace, remains a requirement to fill in the gaps, and broaden the perspective of the image out its context, to the creative process, to words spoken by the entire artistic team, to the reception by the public. An example of complementarity between various supports, purposely non-digital¹, is the recent publication of two works by Anne Teresa de Keersmaecker (Keersmaecker & Cvejić, 2012) (Keersmaecker & Cvejić, 2013) under the title *A Choreographer’s Score*. Both works contain transcriptions of interviews between choreographer and Bojana Cvejić, archive documents, partial musical score, photographs, as well as DVDs of the video recording of the performance being studied, as well as interviews. In these heterogeneous works and multiple synergies, it is difficult to determine whether video recordings is the annotation of the printed materials or vice versa. The ensemble unquestionably demonstrates the complementarity of supports and memories to capture the approach of Anne Teresa de Keersmaecker and conduct an in-depth analysis of works studied. From this standpoint, digital technologies offer infinite possibilities. Without going into too much detail, there are multiple

¹ Anne Teresa de Keersmaecker had been in touch with William Forsythe, who was involved in *Motion Bank* at the time, in the early stages of her project. He spoke to her about his own projects involving digital technologies. Conference given by Anne Teresa de Keersmaecker at the TanzKongress, in Düsseldorf on June 8th 2013.

video annotation tools, used in other contexts: Advене, AmiGram, Anvil, ELAN, On the mark, SSI, Vcode/VData, etc. For instance, ELAN has been used to annotate the creative process of multiple choreographies by Rui Horta within the TKB project (A transmedia Knowledge-Base for the performing arts) led by Carla Fernandes of the Universidade Nova in Lisboa (Fernandes & Jürgens, 2013). Her method consisted in text annotating video recordings of rehearsals, in order to provide details on the creative process. Yet, such tools are rarely used in experiments on the annotation of video recording of the performing arts. A number of hypothesis have been made to explain this: the over-reliance of such software on text, the challenges associated with linking other archival documents, the complexity of use in the time constraints of the capture, for instance in rehearsals, etc.

Development of video annotation systems for the performing arts

This has led to the recent development of initiatives to create applications specific to the needs of the performing arts. These initiatives are undertaken by institutions maintaining archival materials of performances, university research on the documentation of the performing arts, or artistic teams. Although all often collaborate on multidisciplinary programmes, their approaches can be very different and far from overlapping.

One area of research is the development of software akin to the video annotation tools we referred to, but with specific application to live performances. Within the framework of Forsythe's project, *PM2GO* ("PM2GO," n.d.), a new version of *Piecemaker* (initiated by David Kern, a dancer of the company, online since 2014) is a text annotation tool for video recordings of rehearsals or performances. Sleek and elegant, it offers the possibility to collaboratively comment on rehearsals and performances, and to colour-code groups of annotations.

Other research focuses on graphic annotations directly on the video recording, where comments are superimposed on the film. In 2006, an experiment was made by Zachary Lieberman, Scott deLahunta and Susan Rethorst as part of an archival project on the works of choreographer Siobhan Davies. The result was *RotoSketch*, an application used as a prototype during the workshop: "The aim of the software tool is to make it possible for a choreographer to annotate video playing in real-time. The prototype has a small set of features that make it possible to record a phrase of movement material and then play it back on a portable tablet computer while drawing directly on the moving image. The choreographer/ dancer can then use the features to explore different relationships between the action and time of the drawing and the trace it leaves in relationship to the movement" (DeLahunta & Zuniga Shaw, 2006, p. 55). In the TKB project referred to earlier, Carla Fernandes' research explores the same area. In parallel with video annotation software, she is developing a creation tool "to assist choreographers during compositional process" (Fernandes & Jürgens, 2013, p. 119). While the annotation tool has applications for researchers, the creation tool is used by dancers and choreographers, during or after rehearsals.

Digital technologies online allow an appropriation of archival material. Specific online tools can be used to analyse and compare archives and to create semantic links between documents. The *Siobhan Davies Replay* website ("Siobhan Davies RePlay," n.d.), contains the archives of the English choreographer, and lets users create personalized notebooks from online archival collections containing videos, photographs, sketches, etc. which are made available to the public. After selecting material, the user can annotate, classify and share it. MyStoryPlayer, the video annotation application initiative of the ECLAP European programme (European Collected Library of Artistic Performance) is a text annotation tool that can also be used to create links between audio and video material.

Some choreographers and artists' research teams have also used digital technologies in documentation projects for contemporary dance. They include, among others: Emio Greco, Siobhan Davies, Wayne McGregor, Steve Paxton, Pina Bausch (through her foundation's archive programme), Myriam Gourfink, Jan Fabre, Deborah Hay, Bebe Miller, Thomas Hauert and of course William Forsythe, whose pioneering projects have become essential references. Some people, like researcher Scott deLahunta and multimedia designer Chris Ziegler, are involved with multiple projects between which they share reflections, experiences and good practices. These initiatives are driven by such factors as the considerable impact of the *Improvisation Technologies CD-ROM* by William Forsythe, the interest of artists and the public to the creative process, the increasing access to digital tools, including movement capture and video annotation, the increasing interest for the various methods of documentation and transmission of the performing arts, exemplified by the trend of re-staging initial works of a specific choreographer (e.g. Trisha Brown's *Early Works 1966-1979* remounted in 2005, Anne Teresa De Keersmaecker's *Early Works 1982-1987* re-staged in 2010), and by the acquisition by museums of performances (intangible heritage).

These documentation projects, based on video recording annotation, have the fact that they generate choreographic material from the standpoint of the artist in common, taking into account his or her creative process. In other words, the goal is not to outline a single model to document all artistic processes, but rather to start from the unique practice of each choreographer to develop specific documentation. In addition, these projects do not document to leave a trace, but rather to ensure the transmission of the dance to other dancers, even to generate new work. As noted by Scott deLahunta, "These artists [Siobhan Davies, Emio Greco, Wayne McGregor and William Forsythe] and the organisations that have been built up around them have begun to think or rethink in some cases how to create, manage and disseminate their choreographic resources. The focus of this rethinking tends to oscillate between the establishment of an archive and how to fold resources back into their own artistic work" (DeLahunta & Zuniga Shaw, 2006, p. 54). The temporality of archives is no longer a given when transitioning from a focus on conservation to a perspective of recycling. During the process, the actions of cataloguing, and leaving traces of earlier work, are replaced by the collection of various elements for the purposes of injecting them again in the creative process. Documents are no longer considered in view of their heritage value, and become the trigger of new artistic practices. Without going into detail about all the examples, we shall shed some light on the projects led by William Forsythe.

Video annotations by William Forsythe

William Forsythe is without a doubt a pioneer of video annotation in the field of the performing arts. His *Improvisation Technologies*, *Synchronous objects* and *Motion Bank* works reflect a twenty-year reflection on the subject since 1993.

In 1993, choreographer William Forsythe approached German ZKM about a digital archival project to video recording performances and rehearsals. Produced between 1994 and 1999, the *Improvisation Technologies CD-ROM* analyses the choreographic language of William Forsythe, shown with four dancers of the Frankfurt Ballet in approximately sixty short video sequences. Their movements are deconstructed and graphically analysed using graphic tracing and geometric figures drawn directly on the moving image (Fig. 1). Each motion generates lines, plans, rotations, extensions, extrusions, curves, circles, angles, torsions, etc. The video annotation process clarifies the links between the body and the space. Graphic representation is the first approach to using visual data for movement analysis. *Improvisation Technologies* still perfectly exemplifies the Forsythe approach (especially in improvisation techniques) and the new possibilities in dance teaching methods brought by digital technologies. Indeed, the CD-ROM was initially not meant for public consumption but rather for the new recruits of the Frankfurt Ballet, required to very rapidly assimilate Forsythe's method to interpret the

repertoire. It was only in 1999 that Forsythe decided to make the CD-ROM available to wider audiences.

Improvisation Technologies was the starting point to building the *Synchronous objects* website for *One Flat Thing, reproduced* (William Forsythe). *Synchronous objects* was produced by William Forsythe, Maria Palazzi and Norah Zuniga Shaw for the Advanced Computing Center for the Arts and Design (ACCAD) of the University of Ohio. Initiated in 2005 and published in 2009 (Zuniga Shaw, 2011; Zuniga Shaw, Forsythe, & Palazzi, 2009), this interdisciplinary research project sought to use data visualization to expose the writing and composition processes underlying *One Flat Thing, reproduced*, a choreography created by Forsythe in 2000. As noted by Norah Zuniga Shaw, "It was also clear what it was NOT. This would not be an effort to create a score from which the piece could be reconstructed (as is the priority of traditional dance documentation)." (Delahunta & Zuniga Shaw, 2006, p. 60). On its home page it is stated that *Synchronous objects* "examines the organizational structures found in William Forsythe's dance *One Flat Thing, reproduced* by translating and transforming them into new objects - ways of visualizing dance that draw on techniques from a variety of disciplines" (Zuniga Shaw, Forsythe, & Palazzi, 2009).

Synchronous objects is based on video recorded by Thierry De Mey (who also produced a video montage for Arte). The main subject, entitled *The Dance*, is directly aligned with *Improvisation Technologies*, despite a more complex, exhaustive and interactive approach, where graphic annotations no longer translate movement but rather choreographic language. By introducing what could be considered as "macro" visualizations, it displays, on both the video recording and a synchronized score, the theme sequence and repetition, the flow of signals between dancers, and "alignments" (Fig. 2). The viewer chooses between three video standpoints, and four audio modes. The analysis is taken one step further: video annotations and data collected from dancers merge to transform the choreography in a coherent data system for computer analysis, where one single data point can generate multiple display modes, based on the tools available. The result is a set of 20 choreographic objects synchronized with the initial work and comprised of 2D and 3D animations, graphic annotations, interactive tools, diagrams, maps, etc., each visually translating or interpreting the choreographic action of *One Flat Thing, reproduced*, and meticulously documented. For Forsythe, digital technologies let us question the very nature of the choreographic act.

The diversity of objects opens multiple choreographic extensions and points of view on the initial work, which in turns generates rich and complex visual translation without the dancers, but not without the movement. They provide an alternative to verbal language and video recording, or even to notation, in an attempt to express intangible dance. Instead of representing the body's position in space, displaying data reveals dynamics, allows movement perception, and translates it into visual flows.

Synchronous objects is the first realization of *Motion Bank*, a broader research programme conducted between 2009 and 2013, whose main innovation in the two earlier mentioned projects was the selection of the subject matter. Indeed, it no longer started from Forsythe's creation or language, but from those of guest choreographers Deborah Hay, Jonathan Burrows & Matteo Fargion, Bebe Miller and Thomas Hauert. The video recording results again in digital annotations leading to a plastic interpretation by visual artists. For Thomas Hauert, "using the knowledge of choreographic practices as a starting point for digital creation triggers new original artistic outputs, in the field of digital art and of choreography alike. It can create an interesting feedback loop." (Hennermann & deLahunta, 2013, p. 61)

Forsythe's research, from *Improvisation Technologies* to *Synchronous objects* and *Motion Bank* brings up a new paradigm, when "How to remember dance?" becomes "How to seize and capture the essence of choreography?". Video recording has given way to movement

capture, accessible as digital data. Beyond the documentation of important works by the choreographer, another memory of dance implicitly emerges: a memory of the body in movement, a memory that can be reactivated in subsequent works, or translated to other supports and without being limited to video recording exclusively.

Rekall: from video annotation to data visualization

Rekall is an open source environment for documenting and analysing staging processes and simplifying the re-staging of performances. Started in 2007 within the DOCAM programme of the Daniel Langlois Foundation, the project is based on Jon Ippolito and Richard Rinehart's approach to variable media, on digital humanities experiments on Big Data (particularly the works of Lev Manovich), as well as on various experiments with video recording annotation, outlined in this paper. The starting point of Rekall is the documentation of digital performances, a specific performing art form including digital technologies in the creative process or the finished works (Dixon, 2007), and closely adaptable to the specific method of each artist or company. Due to the quick obsolescence of technologies, digital performances are not only as ephemeral as any performing work, but also generate increasingly fleeting components and traces. Thus, it becomes increasingly challenging to document productions and the preliminary creative process, but also to re-stage, even to integrate them to a repertoire. The Rekall software documents digital performances while taking into account the creative process, the public reception and various formats of the production of a performance. It is destined for artists, technicians, researchers and the public. Rekall reflects the technologies used for the performance, and provides a description to eventually offer alternatives using different components. Indeed, I consider it critical to keep the most accurate trace as possible of the technological components, as they are also vectors of aesthetic and historical considerations, and provide a means to describe the very effects of such components, in line with reflections on variable media (Depocas, Ippolito, & Jones, 2003).

As artists are the initial conservators of their work, I started from materials generated by artists and their teams. Their hard drives contain hundreds of documents and data, which comprise today's main traces of performances (video recording, photographs, texts, internet press files, etc.) and the creative process (email correspondence, digital notebooks, digital photographs and video of rehearsals, miscellaneous digital documents showing preliminary research, intricate computer programs developed for the performance, etc.). Such material is not exclusively digital, but rather complementary documents in other supporting media: models, hardware components, stage elements (costumes, sets, etc.), and handwritten notebooks, among others, which can also be digitized.

Among these documents, video recording is in a class of its own. Generally made and produced by the company (for marketing purposes) it is considered as one of the most important traces of the performance. Such material, when used for digital performances brings multiple challenges, including the illegibility of real-time interactivity. Indeed, how to distinguish, when viewing a video recording, real time interactivity (e.g. a gesture triggering a sound or modifying an image), from the synchronization of a dancer with the media used in differential time? Video recording remains difficult to approach, notably in regards to the implementation of technological components. It must imperatively be annotated: enhanced by commentary. Its advantage over programs like Max/MSP patches, which was momentarily considered as a central document (Bardiot, 2009) – is to generate temporal documents (whether or not temporality is that of the production), a timeline on which all materials can be linked and presented with the course of a progress in time: performance sketches, audio commentary, technical element descriptions, etc. This also enables the definition and use of multiple temporal strata: that of the creative process (e.g.: showing when research was conducted on a specific aspect of the performance), of the performance itself (or of other

versions for a work in progress), and reception (for instance by adding audio commentary of the company on its own work, or those of audiences, or press files).

Therefore, the initial phase of Rekall was developed as a video annotation software with three additional functions: the creation of links between multiples documents to comment and provide information on or between documents (the generation of relative databases); the selection of video recording as the backbone on which to structure all other documents; and the addition of text or audio commentary.

Then, considering that nearly all performance forms rely on digital technologies, whether during the creative process (email exchanges, word processing, remote interviews through telepresence devices (VOIP) digital image and video inspirations, new approaches, image sharing platforms, sketches made on a tablet, etc.) or during performances (video, sound and light management), I consider it is possible to extend the application of Rekall to all performing arts, even to performance and installation arts.

In 2012, after a grant contributed to financing the software, Guillaume Marais (human engineering and interface design), Guillaume Jacquemin (computer development) and Thierry Coduys (consultant, designer of electronic devices for live performances and collaborator of stage directors, composers and choreographers) joined the project. Their contribution was critical for what followed for Rekall. We have collaborated with two artistic teams in theatre (Jean-François Peyret) and dance (Mylène Benoit), residents respectively at the Le Fresnoy and the Phenix scène nationale Valenciennes (France). Rekall currently exists as a beta version, and the V1 is expected in November 2014.

Rekall's default display mode gathers all the documents around a video of a performance (Fig. 3)². One moment links to a technical sheet, another to the video of a rehearsal, another to the notes of the stage director. It can also add background text or audio commentary, superimposed as a background voice. Many video recordings may be simultaneously added and viewed, which greatly facilitates the comparison of multiple versions of a performance (Fig. 4) or views over the same performance (e.g. front view vs. overhead view). Initially designed as video annotation software, Rekall quickly became visualization software based on the use of metadata. Indeed, Rekall structures all documents by recovering all their metadata. Therefore, temporal (x axis representing the performance, synchronized with its video recording) and chronological (y axis represents the creative process, from the first rehearsals to the last performances) displays are merely two among many display modes. Through the analysis of these documents, the links made between them, and the careful selection of context (multidimensional, temporal or non temporal), Rekall opens an extremely significant new realm of analytical possibilities. The video annotation function is only one of many metadata display modes, and another mean of document comparison on three axis (horizontal, vertical and colour). Preset display modes are offered to the user, and options are provided to create new ones. For instance, the people activity punchcard mode records when and by whom documents were created or modified, which contributes to the understanding of when the light technician, set designer, actors, etc., become involved in the creative process. This facilitates the comparison of different options, whether in the different works of one single artist, or the work of different artists. For the time being, Rekall has no function to graphically annotate video recordings, as is currently done by *Improvisation technologies* and *Synchronous objects*. Nevertheless, we do not exclude the addition of this function in future developments.

The transition from video annotation to metadata display entails a change in the nature of documents, a new language, or *herméneutique de la documentation* as quoted by Anne

² All Rekall screen captures have been taken from the case study *Re:Walden*, staged by Jean-François Peyret, with a creative process between 2009 and 2014.

Benichou (Benichou, 2014). Not only is Rekall a tool to construct a performing arts heritage archive, but its export functions can be used to send material to Web sites, applications or other editorial platforms to allow the creation of “enhanced documentaries”, of “enriched captures”, and other archival documents to broadcast the studied works to larger audiences. The goal is not to freeze documents but rather to trigger a dynamic documentation that can be enriched, enhanced, made precise, based on the contribution of artists, their teams and researchers, but also lead to a new interpretation based on defined display modes. The polysemic interpretation of documents opens the way to a re-interpretation of works, in the perspective of their adaptations, re-staging or re-enactment.

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Clarisse Bardiot received her PhD in digital performances from the University of Sorbonne Nouvelle in 2005. In 2006 she became an associate professor at the University of Valenciennes. Clarisse Bardiot's grants include Daniel Langlois Foundation researchers in residence (2005). She contributed to the international research program DOCAM on the documentation and preservation of the media arts heritage. From 2009 to 2010, she joined a Belgian cultural institution to conduct two European programs on digital performances. Involved in digital humanities research, she is currently developing an open-source software (Rekall).

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Figures

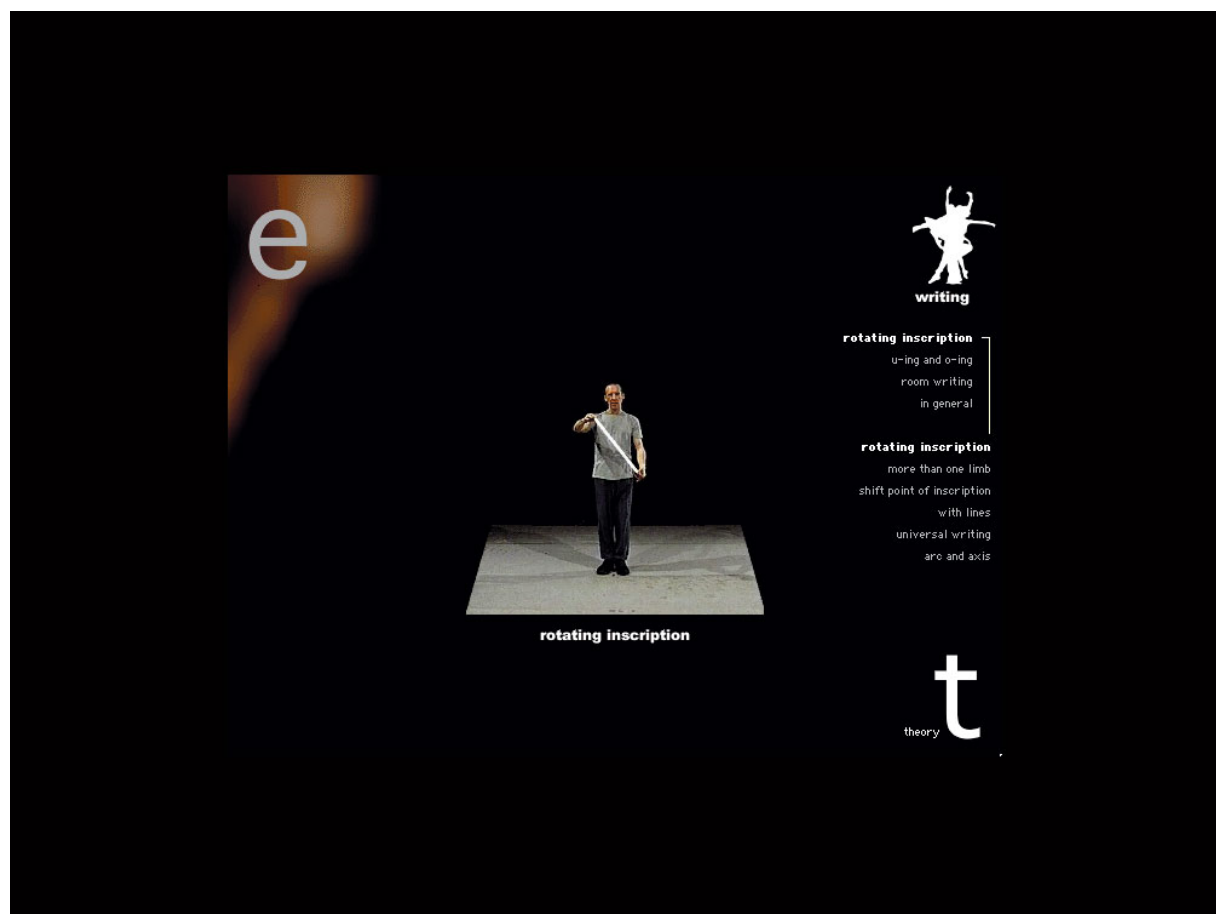


Fig. 1 *Improvisation Technologies: A Tool for the Analytical Eye*, CD-Rom, 1999, screenshot.

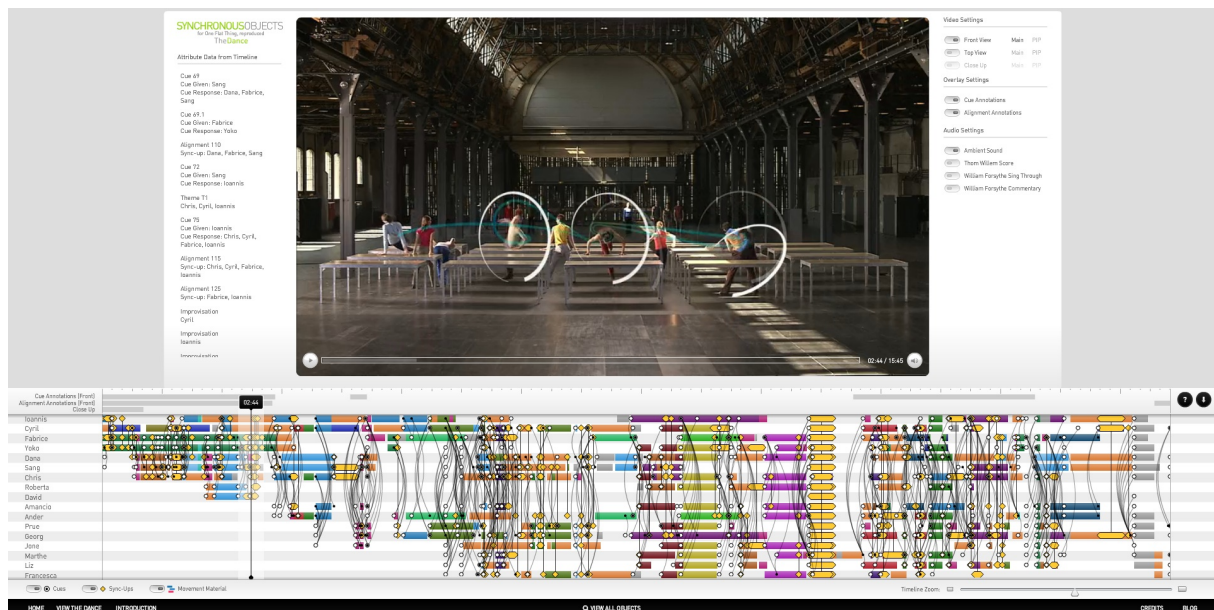


Fig. 2 *Synchronous objects for One Flat Thing*, reproduced by William Forsythe, site internet, 2009, « The Dance », screenshot.

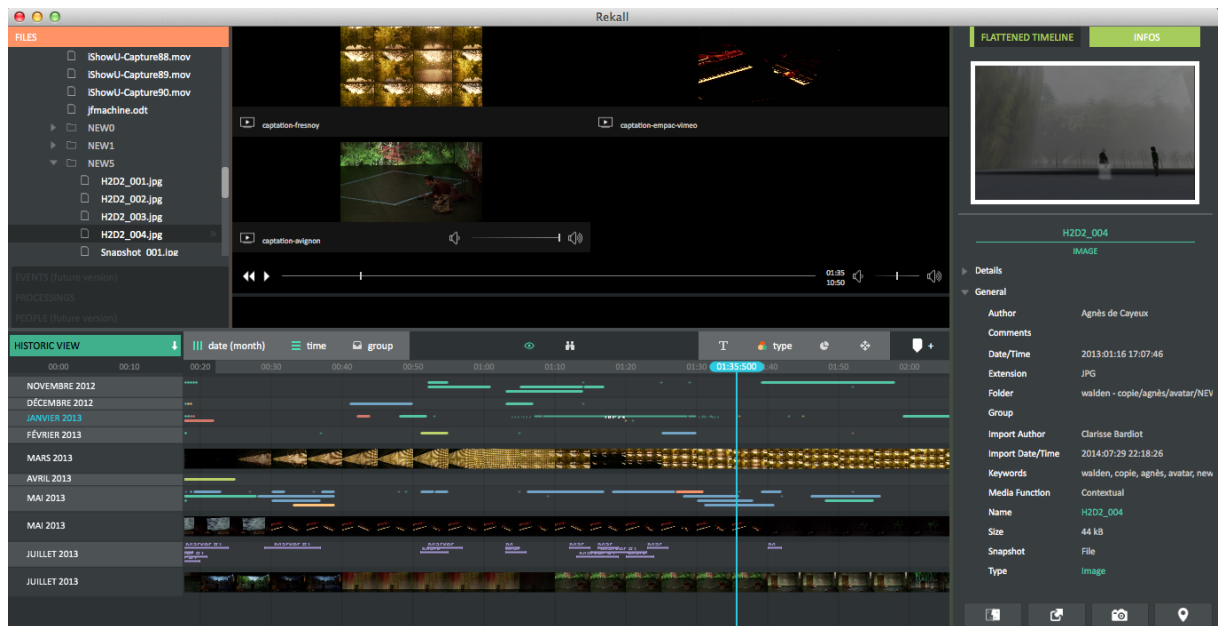


Fig. 3 Rekall - Chronological study of document creation and modifications of a work. Vertical: calendar month; colour: type of document ; text: author ; Horizontal: timeline.



Fig. 4 Rekall - Simultaneous display of three versions of a single project.