Cross Channel Film Lab 2012 – 2014

Report on findings of Stereo 3D test shoots within the Lab

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Background

Stereoscopic 3D, a filming technique used to enhance the illusion of depth, has experienced fluctuating popularity over the last century. In recent years it has been viewed as a potentially separate or complementary medium to 2D film, popularised by high-budget films such as *Avatar* (2009) and *Gravity* (2013).

3D has almost always been used to make watching a film something akin to being on a rollercoaster, a spectacular experience for the audience. Many 3D films (mostly children's animated films, superhero films or horror films) have also had a companion version in 2D and many have had the 3D effect applied to them in post-production. Only recently has interest been piqued in the creative potential of 3D: how can 3D be integrated into the construction of a film? Can 3D engage the viewer in more meaningful ways other than for spectacle's sake? Is it possible for 3D to go "arthouse"? The Cross Channel Film Lab (CCFL) is an organisation that has taken these and other questions forward in its recent research.

The CCFL has acted as a forum for collaboration between leading stereographers and researchers in the field of 3D film. Experienced stereographer Joséphine Derobe, Stereo 3D consultant François Garnier, and 3D producer Fabienne Tsaï joined their compatriot, screenwriter, script consultant and CCFL co-director Antoine Le Bos, in the group, motivated by their desire for 3D to take on a more artistic skin and step away from its Hollywood connotations. 3D has not had much room in which to grow as an artistic medium due to the pressures of delivering pure spectacle but CCFL has attempted to give it that space. By providing the tools to create Stereo 3D films (as well as films utilising other visual effects), CCFL hopes to offer its participating filmmakers some insight into how to plan, write and create projects specifically for Stereo 3D as a new medium.

For funding reasons, the CCFL has so far based itself in two specific regions, the South of the UK and the North West of France. In 2012 the CCFL began initial research and development into 3D and how the project should be operated. The project was announced and a call for submissions from writers, directors and producers was put out in the UK and France at the end of 2012.

Over a period of the next two years CCFL chose to develop four Stereo 3D feature films: two per year, with one project from each country per year. (In each year, the same number and proportion of VFX projects was also developed.) In 2013, the projects *One and All* (UK) and *La Reine du Sabbat* (France) were developed, and test footage for the projects was shot in Stereo 3D. In 2014, the projects *Tro Fañch* (France) and *La Fille de l'Estuaire* (UK) were developed and, again, 3D test footage for both projects was created.

In 2013 and 2014 workshops were organised where filmmakers could discuss their projects with CCFL partners and have the chance to meet specialists in stereography and other visual effects. One problem that came up with many of the projects initially was how to write a screenplay that includes 3D. Screenwriting has conventions about how dialogue and scenes should appear but how does a screenwriter incorporate 3D into their language? This and other challenges were confronted when the Stereo 3D teams began writing and shooting test footage for their projects.

An overall focus of the CCFL2 project was to see if it was possible to make it more feasible to make good quality Stereo 3D films at medium to low budgets (up to approximately 5 million euros). CCFL put forward two hypotheses:

Hypothesis 1

"Giving writers and directors a greater understanding of both the creative potential offered by, and the restrictions associated with, shooting in Stereo 3D, and in parallel, giving technicians a stronger understanding of the requirements of story, will lead to the development of stronger narratives and more compelling and distinctive application of Stereo 3D in feature films."

One of the major goals of CCFL's research was to determine how knowledge of the technologies that create the 3D effect could be used in the initial concept phases of 3D film, i.e. during early scriptwriting and brainstorming. This is an alternative to the usual mainstream practice where 3D is often included as an afterthought on an otherwise 2D project. How could writers and directors unfamiliar with the technology come to learn about it, implement it early on in the filmmaking process and implement it in a creative way? The goal was learning how to use and treat Stereo 3D as an extension of the medium of film.

Some background on the neurophysiological processes of spectating 3D images was needed for writers to make decisions they may not have considered when working with 3D. The learning was not just technological but also had a basis in cognitive science and phenomenology.

The amount of technical knowledge required to understand 3D can make it difficult for writers and people in other creative roles to understand how to approach it. Conversely, technicians working with 3D may also be able to learn how the needs of the story and script might affect the technical demands of the film. 3D is an artistic choice that must be made from the very beginning and the teams that worked with CCFL were encouraged to work under this hypothesis. This is similar to the proposition that the use of animation in a film is what determines whether or not the film will be animated or live-action. In short, how do we integrate a team's combined knowledge of the technology and script requirements for a 3D film?

It was also predicted that including 3D from the concept phase would lead to more compelling applications of 3D, which would in turn lead to stronger narratives tailored to the experience of stereoscopic 3D.

Hypothesis 2

"Stereo 3D offers the potential to add a fresh dimension to stories that involve physicality and nature – themes that have not yet been fully explored within this medium."

With the exception of the adaptation of the dance choreographies of Pina Bausch in *Pina* (2011), physicality has not been a prevalent theme in 3D film so far. Nature is a natural co-theme to the idea of physical space and these themes arose in all of CCFL's projects to some extent or another. The theme was chosen in initial discussion of the CCFL as many felt that it both fitted well with what 3D research was showing at the time and had not yet been a major focus for 3D film.

In conjunction with the first hypothesis, this exploration of the physical and natural world could lead to stories that can only be told through 3D film. Stories that demonstrate how 3D can give new dimensions to not just the space of the film but also to their creative potential.

Contextual Theory
While 3D has little in the way of a fixed terminology there are some useful terms and ideas to bring to the table to give a rounder context to the research done by CCFL. Groups that research into 3D remain scattered, but CCFL, as well as Ann Owen, Alain Berthoz, Olivier Warusfel and Isabelle Viauld Delmon and other researchers, has managed to unite the somewhat fragmented body of research that currently exists. Much terminology, guiding principles and research had already been assembled, independently of CCFL, by the late Alain Derobe in his practice as a filmmaker. In his book *The Stereoscopic User Book*, Derobe describes many techniques, concepts and terms that would be useful to the aspiring 3D filmmaker.

Some research has been done with 3D images to determine how they are perceived neurologically by a spectator. Work by Tomohisha Okada shows that areas of the brain are activated when viewing a 3D image that are not activated when we view a 2D image. These areas are found in the reptilian brain, a section of the brain that is linked to emotion, tactile sensation and the fight or flight response. Neuroscientists such as Paul MacLean theorised that the primitive reptilian brain deals with stereotyped, pre-programmed behaviours. The same situation, with the same stimulus, will always result in the same response. This response is immediate, like a reflex. Behaviour induced by the reptilian brain cannot evolve with experience, cannot adapt to a situation, because this brain has only short-term memory. The upshot of this is that 3D engages a different cognitive reaction than 2D, and 3D filmmaking might be better served by utilising this information. Alain Berthoz' research on the perception of movement backs up these findings, stating "… there is no perception of space, of movement, neither vertigo nor loss of balance, nor a caress that is given or received, nor a sound heard or made, nor a gesture of grabbing or gripping, which is not either accompanied by an emotion or which causes one."

Stereoscopic 3D film differs from regular or 2D film in several ways. The first and most emphasised aspect is that, physiologically speaking, a 3D image takes longer for the brain to process than a flat image does. In 3D film this means that greater time must be allowed for a spectator to take in what they are seeing. For example, an establishing shot may be achieved quickly with a 2D film but a 3D film will have a "space" that the spectator can scan to find different things happening in different planes. 3D films tend to benefit from longer holds and fewer cuts than we are accustomed to with modern 2D film. For the spectator, time appears to be condensed in 3D film, which this principle can take advantage of. A five-minute shot can feel like two minutes because of the greater effort required of the sensory apparatus of the spectator.

This principle was one of the cornerstones of CCFL's teaching about 3D. François Garnier describes the impact of this discovery in a recent article.

Garnier: "The brain demands time in order to project itself into the space which it is being shown, to explore the possibilities therein, to imagine future actions, to prepare to invest physically, to touch it. The editing has a slower rhythm, the camera is more active, calling for an exploration of depth, dollying in, subjective vision, personal involvement … Framing and editing, the two main principles of cinema, are profoundly transformed and updated by the presence of a new dimension. Everything must be revamped, from the directing and the themes to the writing."

Directors and writers who are conscientious of the time required for the brain to process the illusion of stereopsis will most likely gravitate towards longer, more deliberately choreographed shots and rely less on editing to achieve the film's goals. However, this principle is not as widely known as pioneering stereographers would like, and many films still use 3D as a mere visual effect applied to 2D film grammar.

3D filmmakers must also be aware of problems that 3D may run into. Window violation is a phenomenon that occurs when an object of focus is on the frame border. The object is perceived through the illusion of stereopsis but the edge of the screen is perceived as being in front of the image through the occlusion effect (when an object overlaps another to indicate depth on a flat plane) which cancels out the 3D effect, flattening it. Roughly a third of audiences find this problematic, but it is not so much of a problem when the field of view is smaller than the frame borders. This can be a problem where cinemas are so large that a sizeable portion of it can be quite commonly perceived, and it is not generally understood by filmmakers.

Alain Derobe originally coined the term "scenic box" as a way to describe the imagined space of a 3D film. A pair of flat images (moving or otherwise) projected together creates a sense of depth that is reminiscent of the space of a theatre stage. The illustration below is compelling in that it demands that we rethink many of the conventions of flat or 2D film to account for this new type of space which the audience observes. The scenic box, as shown here, demonstrates three distinct planes comparable to the areas of a stage in which attention can be directed. There is a background area, a screen plane and a "coming-out-of-the-screen" area.
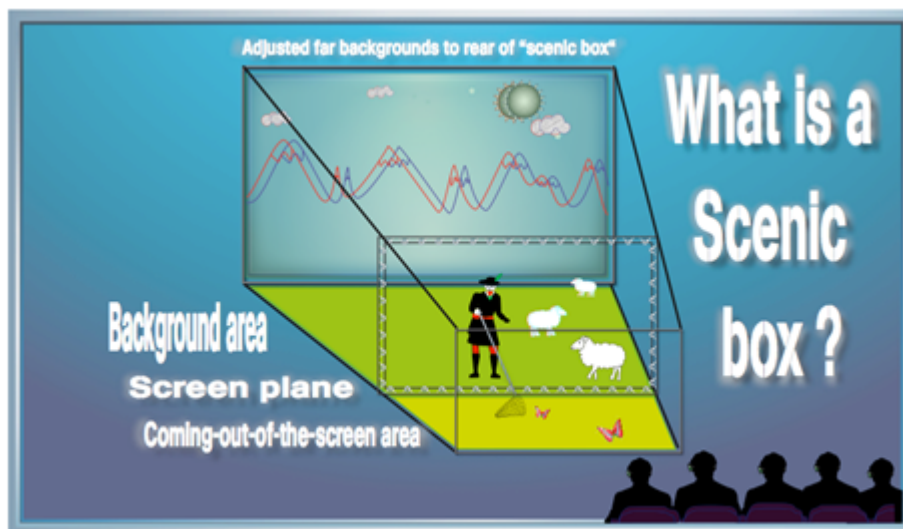
Illustration by Alain Derobe

Joséphine Derobe's observation is that looking at this scenic box requires us to form a new language to describe what is happening inside the box. This language may be informed by 2D film grammar but it is not enough. The way one thinks about editing, sound, direction and so on must change.

Sound is one aspect of 3D less often considered, but Warusfel's research has touched upon the subject: "In the world of sound reproduction or communication, future audio technology will favour the senses of immersion and presence. Such notions are intrinsically linked to the spatial dimensions of a multimedia scene (in particular sound) and are notably reinforced

in situations involving the listener's own action, either as he navigates the scene or as he physically interacts with the objects therein. In these conditions, made possible by holophonic or binaural technology, the congruence and real time refreshing of the spatial auditory cues relative to the movements or actions of the audience have a bigger impact on the sensation of presence. This new context has motivated the launch of a series of experiments devoted to auditory spatial cognition, in particular through the study of the process of multisensory integration."

How the impact of sound in 3D can be seen further in the CCFL 3D test shoots is referred to in the conclusions section below.

In terms of theory, Antoine Le Bos was particularly interested in the link between phenomenology and 3D filmmaking, focusing heavily on the work of Merleau-Ponty.

Le Bos: "During a Groupe Ouest workshop, François drew our attention to the notion of motor resonance, intuited by Merleau-Ponty. That while watching stereoscopic images, this phenomenon sweeps over the viewer, stimulating imperceptibly all his muscle chains, a sort of standing to attention of his ability to grab, leap, caress … The core of his theory/vision consists of notes for his lectures at Collège de France, the sensitive world and the world of expression, which I embarked on fascinated for a week's immersive reading in the countryside. According to him, depth is '… that guided step towards a privileged state, the resolution of tension, a response to the patchy character of the perceived being, search and expectation, consent and abandon. Vision of depth is in deep connection with our ability to move, imagine, desire.'"

The philosophical side of 3D film is perhaps the most underexplored, and CCFL included this in much of its contextual information for the filmmakers.

The CCFL Projects

Each project will be synopsised and discussed below, analysing the team's goals, experience and what has been learned.

One and All (2013)

Henry Davies (writer-director), Will Coleman (writer), Graham Mitchell (writer), Denzil Monk (producer), John Crooks (producer)

A story of loss and tradition where the determination of one man inspires a team and reawakens the hope of a nation.

A sea of black and gold: 40,000 men, women and children, one tenth of the Cornish population, travelled to Twickenham that historic day to follow a dream – to support their team, to be together, a nation searching for hope, to claim a moment of pride.

One and All tells the story of Cornwall's victory in the 1991 Rugby County Championship. It follows the personal story of one of the players on the Cornish team. An amateur team, Cornwall was considered the underdog yet managed to win. The main character, a former tin miner and fisherman struggling to make ends meet in Cornwall's industrial decline and then recent recession, is the central focus of the film and is typical of many working men in the area at that time. The story is a traditional meteoric rise of average joe to sporting hero. The title is the English translation of the Cornish saying "oll an gwella".

Denzil Monk and Henry Davies, the film's producer and director respectively, discussed the inception of and test shoot for the film.

Davies: "We wanted to do a concept retelling the underdog struggle of the Cornish people using the metaphor of the sporting event. The fact that it was a true story was icing on the cake; one of my favourite genres of film is sport. It's those 'will over skill' kind of stories.
I started talking it through with Crooks [John Crooks, another producer on the project]. I first suggested it as a documentary but we thought about it and decided it would be a perfect narrative piece if treated in the right way. Not as a 'kitchen sink' melodrama but a sports movie with a working class framework. Similar to *The Full Monty*, *Brassed Off* or *Billy Elliot*. We wanted to tell an uplifting story and show a cool game of rugby."

The story was of great importance to Davies as a narrative document of Cornish sport and the team believed that 3D would be a good fit for showing the game.

Davies: "It interested me that it was about rugby. I've never seen a good film of rugby ever and the sport is growing in popularity. There's so much scope to tell a broader story. It's a rich part of Cornish heritage. A lot of sport now is shown in 3D. Sky Sports 3D shows rugby, football, but only as a spectator from the outside. You never see it from the inside. If you've ever played rugby you know you're either right in the thick of it or it's happening on the other side of the field. I wanted to bring that elastic sensibility to the film. Once 3D had been mentioned it would be a massive advantage. Even if the audience didn't know anything about the sport they'd be able to feel what it was like being in the sport, elements of teamwork. Sell that emotionally to an audience, then the rest of it falls naturally into place."

Monk: "From the outset we were thinking how 3D would work. How could rugby be portrayed in 3D. In the scrum, getting up close, and how that would work. *Pina* was useful, since we learnt that the physical body works well in close proximity in 3D. We wanted to apply the same approach as *Pina* to a rugby game. Also more subtle dramatic situations worked in 3D. The test shoot focused on the gameplay of rugby. It was filmed on a pitch with lots of bodies moving around."

In *One and All*'s test shoot , the physical nature of rugby is the driving force, but the team also intended for 3D to be used when telling the story of one of the Cornish team's players. They saw that 3D might allow for an intimate exploration of the character and their struggle. The team were excited about the project but recalled their initial process of learning the theory behind 3D and putting it into practice.

Monk: "With a new subject it's really important to do the theory stuff first. If we'd done the shoot without the theoretical understanding we wouldn't have gotten half as much out of it. The speed of turnaround on shots wasn't very fast. You have preconceptions of how you're going to shoot things, but we had to stop and say 'OK we need to rethink this'. In pre-production there were lots of discussions about what was possible and we went into it armed with an understanding of 3D."

Davies: "Marrying the theory and the practical aspects was not easy. The way it was taught to us was somewhat esoteric. I'm from a very practical background. While I love the theory, without any real hands-on experience with a 3D rig we had to rely heavily on input from the stereographers. I would say 'This is the shot I want' and they'd say 'Well, that's not possible' or 'Try it this way'.

My vision for it changed and was ultimately a watered-down version of what I wanted. The idea was to shoot a dramatic scene in a bar and an action scene on a field, with the lead character getting the shit kicked out of him on rugby field. We kind of achieved it but not really. We got 60 seconds worth of rugby footage with a very loose story."

Davies: "We had a first introduction to it there [CCFL]. I learnt what it was to plan and execute a 3D scene. Theory, like any plan, falls apart the moment you put it into practice.
I had this idea planned out but there were material shortfalls and personnel shortfalls on the day that didn't make my job easier. You can plan to incorporate it into your film but you need 110% more time to shoot in it. There's two cameras."

While 3D allowed for new approaches to filmmaking, the team found it slow to work with due to increased setup time and not being able to really know how the footage shot will look until a screening of the footage. It would have been preferable for 3D filming to be a more naturally iterative process.

Davies: "It should've been pre-visualised on an animation rig. The pre-visualisation that was done with the cinematographer, we thought how best to show it from a 2D perspective and then looked at it again with our 3D heads on. Until you see it you just don't know. I don't have any ingrained understanding of what was deliverable in 3D."

The stereographer Davies was working with was still learning 3D filmmaking and was not as experienced as Davies would have liked. Unfortunately Davies found the end result unsatisfactory but again stated a forward-looking perspective of what could be done differently.

Davies: "If I had been directing and producing it over a longer time, tying the theory to the practice, we would have had a better result."

There was some frustration with the limits of 3D and its understanding by the crew but there was a sense of acknowledgement that all they needed was more time to learn or to work with a more experienced crew. Unfortunately CCFL had limited time with each team but Monk and Davies did not necessarily perceive this to be a limitation of the medium.

Monk: "On set it's just another technical thing. There are no limitations on it in a general way; it's an entirely different approach, like the difference between live action and animation. How the dramatic intent is portrayed in 3D versus 2D is different. It was most impactful to take a completely different approach to shooting some scenes. Some is very basic. Crosscutting between dialogue doesn't work in the scenic box in the same way. You might have a lot of crosscutting in 2D; you might have a swinging camera in a continuous shot in 3D.

The most useful thing was having gone through the process, being able to see it on a screen in 3D when you've finished, that completes the learning cycle. And it would have been nice to play some more with it. It would be good to be able to do the filming in a day or a couple of days. Familiarity is important as well, 2D grammar is understood in an innate way; unlike 3D we know the 2D grammar of film. 3D is less familiar, there's very few 3D films that explore it and use it. It's still in its infancy."

Davies found much of the theory presented by Antoine in the workshops interesting but was not convinced of 3D's future due to financial considerations and audience interest. And

while the plentiful research on 3D was interesting it could be overwhelming to people new to 3D filmmaking.

Davies: "The technical and logistical requirements of building that team and other practical considerations had to be right and that rapidly overtook the philosophical side of it. Antoine had set up some incredibly diverse speakers, looking at how the human eye tracks movement in 3D space and so on. At the end of it I was wondering if I was even equipped to work in this medium. They'd show us a 3D film and I'd go 'that's really powerful'. But then they'd show another and it wouldn't be the same. Not everyone's affected by 3D in the same way in each case."

Davies' final takeaway was that 3D film is an exciting field but that post-production as opposed to native 3D is probably the most cost-effective way of going about filming in 3D.

Davies: "I don't know if the niche audience for 3D is a possibility. Time and money is the key. If you've got two cameras, two lenses and a mirror between them, there's so much that can go wrong that it's a technical hurdle that the majority of sensible people would probably avoid. Post-production works from what I've seen. There's a niche of people who want to make these things and they will receive funding from niche organisations. A commercial perspective makes much more sense with big-budget 3D versus low-budget 3D."

Talking about his experience since working with the Lab, Davies expanded on his thoughts about the future market for 3D film.

Davies: "The attendant costs of time and money mean it would not be practical to shoot in native 3D at the moment. We need a single unit camera and to have little room for error. As an audience member I love 3D. If it's technically well-implemented and serves a defined emotional purpose then I'm a big fan. As a filmmaker I can see the value of making a 3D movie, but right now the shooting tech (splitter rigs, multiple cameras, lenses, etc.) is too disruptive to a tight shooting schedule and costly to a tight budget to make it viable."

It is clear from Davies' comments that there are those who disagree on how 3D should be produced and that it may be difficult in the future to convince those in executive roles to fund films even on a lower budget. However, both of these problems can be alleviated by the spread of a better understanding of 3D filmmaking. Davies was initially very excited about 3D and despite his concerns about its production and place in the market, he has gone on to work on other projects that utilise 3D. Stereographer Joséphine Derobe was conscious of Davies' desire to do it differently but thought it encouraging that the directors wanted to try different approaches within 3D filmmaking as that is what the CCFL is there to facilitate.

Monk: "I'm working on another project now that fits 3D much better. I've got some 3D knowhow now and can move forward with 3D films. The partnership between France and the UK was great. The French crew were good and meeting those people was a great experience."

One and All had one of the shortest pieces of test footage among the CCFL projects and depicts a rugby team readying themselves, a quick series of shots of the game in play, the main character being tackled and a touchdown being scored. While much of the test shoot was quite conventional in terms of filmmaking there are some interesting conclusions. For instance, the use of sound was highly successful. After the main character is tackled we hear a very distorted effect on the sound around him. This communicates both his winded physical state and that the soundscape belongs to this character: we hear the world through

his ears. As a touchdown is scored some distance behind him we just barely hear a dull thud. This gave visual depth while remaining in line with the character's experience of being inside the game of rugby.

Davies originally wanted to depict the players as "warrior-like" but the shots of player collisions in slow-motion actually revealed how vulnerable and fragile the human body is rather than projecting the players' strength. Although this is not what was originally planned it had a positive effect since the shot actually reveals how human the lead character is by showing him in a moment of weakness where his body loses control. 3D consultant François Garnier recalled that the team wanted to frame the players as heroes, using techniques often used to film action, such as P.O.V. shots, slow motion and lots of cutting, all to communicate the motion of the game.

Garnier: "All that is from a 2D code. The interesting thing is they get exactly the inverse. The people, the players on the field, didn't look like heroes, they look terribly human. And that is a very interesting demonstration that 3D can put you more in a kind of empathy with the people."

The *One and All* team intended to film a scene set in a bar which was designed to show a more emotional and empathetic side to the main character but were unable to. Yet the frailty in these very human players is revealed by the action on the field in an unexpected result.

In the end, the team enjoyed their time with CCFL and found it a valuable learning experience. Despite some difficulties while producing the test shoot, some useful findings were reached.

La Reine du Sabbat (2013)
Pablo Agüero (writer-director), Nicolas R. de la Mothe (producer)

1609. A village deserted by men. A young girl inducted into nocturnal dances in the forest. A judge called in for a witch trial. An irresistible fascination with evil.

At the beginning of the seventeenth century in the kingdom of France, in a wild place between the mountains, the forest and the sea, there are no men, only women. The men spend several months each year away fishing. Alone, the women have their own rituals and dance around a bonfire all night long in a forest.

Today is the last day of 14 year-old Amaïa's childhood. After she joins the women for the first time, she gets lost in the forest and at dawn she is arrested and accused of witchcraft. The judge, Pierre de Lancre, a charming 50 year-old man, has been sent by Henri IV to exterminate all the witches of the locality. But his own obsession is to learn everything about the Sabbath, the legendary celebration where witches are supposed to meet Satan.

Little by little, de Lancre forces Amaïa to say exactly what he wants to hear. Little by little, he pushes her to become a real woman, a real witch. She realises that the only way to survive is to play the judge's game, but little by little, the game becomes real, until the only one who can save Amaïa is Satan himself.

Producer Nicolas de la Mothe and director Pablo Agüero had been developing a script together inspired by Michelet's essay *The Witch* and other writings on women and witch stories in the 17th century. The film was initially a historical piece about witch trials where the group collaborated with a specialist in witch history. Another idea was for the movie to be a sort of feminist documentary but Agüero decided that telling a story should be the focus.

de la Mothe: "We discovered a book about a famous judge, Pierre de Lancre, who wrote some crazy stories about the South West of France at beginning of the 17th century. His most famous book was *Tableau des mauvais anges et démons.* He was very different from other judges of the time. He was interested in very young women but was also afraid of their perceived sexual power. A lot of his trials were with young girls 14 – 20 years old. He was obsessed with the idea of Sabbat."

Sabbat is the rendezvous of witches and other magi for the purpose of dancing and other forbidden rituals and formed the focus for the test footage's final script.

The first draft had historical elements and was intended to be a kind of trial movie. The script went through numerous iterations but the judge remained the central character. The judge's story of fearful curiosity about ritual and the elements is the core of the film.

de la Mothe: "We were very interested in representing the power of the elements. This judge was related to Henri IV and also to Montaigne. He was Catholic. Frightened by the baths in the ocean that people would take, really shocking stuff. He was also obsessed by the power of the sea, it's like pure evil, something you can't fight with. So there was this idea of the seashore and the mountains as well. You can't make anything grow in the earth near mountains. It's dangerous, and you can't control the elements, which were really important to the judge and for Pablo. He was always talking about the importance of finding an appropriate language like New Impressionism to figure out this guy's fear and the power of the elements. It's not a fantasy movie, just a movie about scary people and young girls being arrested for no reason. There was a fantastic feeling about it we needed to express with the characters."

Agüero: "I'm always looking for new ways of giving different kinds of relief to the screen. 3D is just one of them. I still dream of creating something new, another perception of reality."

Agüero enjoyed *Haxen*, a 3D movie about witches, but didn't want to do a pastiche of it. He stayed at Le Groupe Ouest as a participant in its script development programme, and met Antoine Le Bos.

de la Mothe: "Pablo talked about the film with him and they were immediately attracted. This wasn't just a typical French movie, Pablo wanted the international aspect for a new feeling. We never did 3D before so a low-budget arthouse 3D movie made sense just because of what we were looking for. We wanted to communicate the feeling of the characters and the mysterious, mesmerising atmosphere of the movie."

Agüero: "My feeling is that 3D looks very old, like spirit pictures. It makes me think about the possibility of filming spirits."

At the CCFL workshops they met with Joséphine Derobe, Antoine Le Bos and François Garnier and were inspired by the possibilities that 3D offered in exploring a new way of storytelling.

Le Bos: "He [Agüero] really came to the workshop not being sure that it was the right medium for his project and he's been really trying to follow, just to see, just for the sake of the experience, what the 3D specialists have been trying to teach him."

Agüero was so enamoured with the theory that he rewrote the original 3D test shoot screenplay to better incorporate what he had learnt about 3D during the workshop. Garnier recalls Agüero's decision after receiving advice about 3D.

Garnier: "He said 'OK, if you don't like it I will do exactly what you say. I will make a long shot, I will move the camera and hold the shot and I will structure all my action in front of this movement.' And the result is interesting."

In this way *La Reine du Sabbat* benefitted from professional advice from practising stereographers.

de la Mothe: "The CCFL crew got together for the first session. I didn't know what to expect exactly from 3D but it was very interesting because we learned a lot about the specifics. 3D could be hard for the viewer if it's not used properly but it can also be used very differently from Hollywood blockbusters. The only one Pablo had seen was *Avatar* and he didn't think much of it. *Pina* was a big revelation; it was a shock. He saw something he was really looking for in his movie. What he learned from it was you can create something really not realistic. You know, it's uncanny for the viewer. What he also learned is that you don't need to cut a lot in a 3D movie because it can be uncomfortable (to watch). Joséphine suggested using a very slow camera motion, which is intriguing for the viewer. He decided to write a special scene just for the shooting test, which wasn't in the script."

de la Mothe described the scene the test shoot set out to capture, and where 3D was brought in to emphasise the goal of a mysterious, uncanny atmosphere. The whole test shoot is one continuous shot.

de la Mothe: "The scene is: you see a church just across from the sea. We had two girls and the character, the judge, and you can see him from the church. The camera's point of view is looking out of the church. It's night, he's coming to the church and he looks very suspicious. Joséphine told Pablo it would be interesting to let the camera move very slow and move backwards. So the judge just comes very slowly, very close to the camera which starts to move slowly back through the church.

Then we discover what the judge sees and there is a choreography of young girls dancing. They're scantily clad with see-through clothes, there's candlelight, slow music. The camera goes out from the church by the main door. The judge comes around to the front to see her, to maybe arrest the girls, and when he appears at the door the girls have disappeared. He has a look around and at this point another girl is coming to the church, she's a religious girl. She's very frightened by this man and it's a scary and embarrassing moment for him. He gets startled and starts to run away, she looks around for him in the darkness which is a very long shot lasting about 20 seconds. At this moment you can't see anything in the church. When she goes through into the church we change all the lights. One of the girls we had dancing is here praying and she joins her to pray and she tells her about the strange man."

The team considered the test shoot a success and found 3D emphasised the film's goal of an uncanny, mystical atmosphere. They also enjoyed working with a diverse international team.

de la Mothe: "It was really fun to do. When we did it the English team came with a very different perspective, they edited the thing together which was a completely different approach. That single scene was hard. Without the 3D that whole scene wouldn't have been written in the first place. You know it's very slow, it's nice to have the viewer take the

time to view all the details. It feels very close because of the 3D. You have hands coming near you but there's also something not very realistic about it so there's some uncanny feelings about it. It's nice to come very close to the girls' bodies, it's like a kiss with the camera. That uncomfortableness is something you want to achieve sometimes. To ask yourself about your own fantasy. If you were a judge at this time you might have done something crazy. Only 3D would express this properly. It was nice to work on a script written uniquely for 3D and with a 3D team who know what they're doing. You have to change the way you film it and present it."

Agüero considered the challenges of 3D filming to be fairly similar to those of 2D film, with the exception of the mirror required for a stereoscopic camera.

Agüero: "Using a mirror is a problem for me, because of the diffusion of light and the consequent loss of contrast. It's difficult to say. Maybe my conclusion is that cinema is always the same, you have more or less the same problems, the same expressive choices to make, even when you change the technical devices."

de la Mothe's final thoughts on the project were positive but he cited the costs and public perception of 3D as a concern when embarking on a 3D project, especially when it comes to low-budget arthouse projects.

de la Mothe: "We were very scared about the extra cost. 3D's nice because we can do something really a bit fresh, a bit new from an artistic perspective, but as a producer I need to consider how we would finance and market an arthouse movie in 3D. I can't say it will work until the end, we don't know if it's going to be possible. We are convinced by the 3D experience and the limitations we faced were not so technical. It's a real cost to add another camera and it took quite long to assemble everything at the beginning. We were afraid of waiting a long time to shoot on the set.

The main limitation is whether the market is ready for it. 3D is used for big blockbusters and people can feel it is a trick to get them in the theatres. We're quite lucky in France. We have some good opportunities to find money for new technologies and for producing this sort of thing, but distribution for lower budget is difficult, especially in 3D. It's a tricky situation with competition from other films, and lower budget films struggle. Bigger cinemas won't even be interested in anything arthouse. It's between two markets.

There was nothing bad about the experience with CCFL. It was a bit of a mess because it was the first time with them and we were full of energy. We wanted to do as many things as we could so perhaps it was not as focused as it could be. It was mostly exciting though, we really wanted to do the movie in 3D."

The dance choreography of the test shoot for *La Reine du Sabbat* gave the impression of sinewy strength to the young dancers. This may be a result of slower movement allowing for the eye to have more time to take in all the information on screen. The test was highly successful, building on established practices in 3D (such as the slow backwards-moving shots recommended by Derobe and dance choreography seen before in 3D in *Pina*) while experimenting with new ideas (shooting in darkness in 3D). Overall the project flourished thanks to Agüero's skills as a filmmaker in combination with consultation from expert stereographers like Derobe to produce a compelling demonstration of 3D's strengths.

Derobe: "It is a beautiful example of staying on an eight-minute long shot and still being totally fascinated by moving sensuality. But because there's really strong research behind

his movie that's close to the director's intention from the beginning, the result of the two together is good."

La Fille de l'Estuaire (2014)
Gaëlle Denis (director and co-writer), Ohna Falby (producer), Christopher Andrews (co-writer)

A dark and poetic portrait of the inner life of a ten year-old girl caught in the grip of her own imagination.

La Fille de l'Estuaire is a modern surrealist tragedy that takes place around the Penzé estuary at the end of summer. Véfa, a lonely and rather strange ten year-old girl, makes friends with Nathalie, an enigmatic young woman she finds in a crashed car down by the estuary. Fleeing family tensions, a mother incapable of affection and the cruelty of the village children, Véfa starts to spend more and more time with Nathalie.

La Fille de l'Estuaire is a film that examines the world through the eyes of a young girl, Véfa. Director Gaëlle Denis explained that 3D was intended to create this link between the perspectives of the spectator and the little girl.

Denis: "The images that are generated by 3D stereography are quite immersive and in a way they are very in tune with the feeling that's coming from the story."

The goal was to increase immersion and identification by bringing the spectator into her partially imaginary world. A second goal was to communicate the texture of objects in the spaces of the film. The texture of natural objects becomes a focus for the film as we see objects in extreme close-up: lettuce leaves, fur, blood, hair, wood and vapour.

Script consultant Antoine Le Bos noted that having to consider 3D crystallised these goals for the team.

Le Bos: "Thinking in a 3D way for the writing and development of the story led us to insist on going to the core of the story and has been pushing us to make the story better anyway. It was really trying to find the essence of what the story was about and I think Gaëlle has reached a deeper understanding of her subject, probably thanks to thinking with 3D in mind."

The test footage that was shot focuses on four scenes, each exploring various ideas.

The first scene shows Véfa walking through a lettuce field carrying a (presumably dead) rabbit. Depth is emphasised here by Véfa's figure cutting through the large leaves of lettuce as she walks through the field. The camera moves backwards while the girl walks towards the camera as lettuce leaves slowly recede into the background. Denis, the producer Ohna Falby and co-writer Christopher Andrews felt this scene to be the most successful in the shoot. The camera's low-angled perspective was intended to mimic Véfa's lower stature amongst relatively large lettuce plants. As in *La Reine du Sabbat*, moving backwards slowly is shown to be effective here as it draws the spectator back from a start point to reveal the depth of the image as it passes by them. High contrast colour is employed to help Véfa, dressed in blue, stand out from her pale light green surroundings. There is also the contrast of texture, the rough wrinkled leaves countering the softer surfaces of the girl's dress and the rabbit she carries. Texture, depth and the girl's perspective are all communicated simply and succinctly.

The second scene was an attempt to film dialogue for 3D without cutting between two speakers. The scene shows Véfa coming across a young woman who appears to be the victim of a nearby car crash. The two sit by an estuary where a short dialogue scene is shot from several angles on Steadicam. The speakers sit side by side and are both in shot for most of the scene; occasionally one will be on a different plane. This was interesting as it allows for the audience to focus on both the speaker and their partner's reaction to what they are saying, without the need for editing between a shot and a reverse shot. However, Denis reported that there were a lot of problems with the video and audio assist feed going out during filming of this scene so the crew could not hear what was being said or see what they were filming. As a result some of the dialogue was improvised as the filmmakers could not give direct feedback during the shooting of the dialogue, and Falby felt that the scene did not come out exactly as intended.

These technical problems on the day, while unfortunate, emphasised the short amount of time the filmmakers had to really get to grips with the medium. Falby mentioned that doing two test shoots instead of one would give filmmakers an opportunity to learn from the experience of the first shoot. Obviously each team only had a limited time to work with CCFL, but the concern was raised as Falby and Denis felt that working with a completely new medium for the first time and for such a brief period was made more difficult by the technical difficulties the team experienced. In any case, they considered it a lesson learnt that a lot more time and prep is needed for filming in 3D during the early learning of the medium.

The third scene follows Véfa into a room in the upstairs of her house where many taxidermied animals stand motionless. Voices can be heard, implied to be coming from the animals, as she adds the dead rabbit to her collection. Steadicam shots pan around the room, focusing on each of the animals. Denis and Falby found this scene to be good in terms of developing the girl's perspective, another example of a close look at different textures similar to the goal of the first scene. The scene is useful from a sound design standpoint. The imagined voices of the animals the girl has collected do not actually occur in the space, which means the sound design can be more creative with where the sounds come from. They are implied to be heard in Véfa's mind so where this sound comes from in relation to the audience is interesting to consider. This is done with a more intimate take on the whispering voices that falls in line with the goal of bringing together the spectator's and Véfa's perspectives.

In the final scene the girl and her father sit watching a black and white television, which created some interesting effects in 3D. Denis chose to include the TV scene to show a contrast in the colours of both the TV and the film itself as well as to try out subtitles on a screen in 3D. The unintentional consequence is that the TV heightens the 3D effect as the screen appears completely flat inside the 3D space since it is a flat glass texture. This gives a slightly metafictional quality to the scene as an older medium enhances the depth of the 3D film in which it is it is featured.

The team experimented with different camera setups for each scene. The first scene uses a constantly moving Steadicam, emphasising depth by following the girl's movement through the lettuce field. The second scene uses more establishing shots and close-up shots to allow the eye to wander during dialogue. A more mobile Steadicam is used for the third scene to explore the girl's imaginary relationship with the taxidermied animals and focus on the texture of their fur, panning and orbiting around the various creatures. The final scene used a dolly for a simple series of stable shots of Véfa and her father. While other teams

found a crane useful for some of the longer shots so that the relatively heavy cameras could be stable, Denis and the team avoided using a crane to keep things simple.

Falby had worked a lot with video and installation artists and felt that many art projects would benefit from 3D and that it is a viable space for the medium if it can be done on a low budget. While initially interested by 3D the team did feel that there was a certain amount of extra work that is required for 3D even if the budget is kept low. Stereoscopic camera setup, post-production and the audience experience are all things to consider throughout the project which may generally require extra effort from the filmmaker. The team overall felt that it was a compelling new way to see things. The advice to take things slower in 3D has allowed them a more contemplative perspective on other projects and helped give context to 2D as well as 3D filmmaking.

Tro Fañch (2014)
Giil Taws (director and co-writer), Christophe Briand (co-writer and actor)

An over-ambitious bicycle dealer is unexpectedly forced to make a cycle trip around Brittany and rediscovers the beauties of the world that surrounds him.

Armand, who runs a small bicycle shop in Brittany with his daughter Aurélie, has been working for years on the commercialisation of a collapsible bicycle, which he is ready to present to a group of investors. Aurélie discovers that Fañch, her grandfather, who was about to set off on a bicycle trip through Brittany, has died, and insists on making the trip in his place. After an argument between her and Armand, Armand decides that he must make Fañch's journey himself, thinking that it will only take him a couple of days to complete.

Nothing goes according to plan: Armand has overestimated his physical condition, he meets obstacles along the way, and his meeting with the investors is brought forward. Finishing the trip could jeopardise eveything he has worked for. After disaster strikes, Armand learns to take life as it comes and appreciate what he has, returning home a changed man.

Tro Fañch (2014) is a road movie; the film explores the idea of using 3D effects to illustrate the main character reconnecting with the natural world around him. One early example is a scene in Armand's bike shop. While his daughter works alone on a bike we see the stereoscopic effect which is then flattened once Armand enters. Armand's daughter works on a bike in the dark. The shot holds for a while but is interrupted by Armand coming in and turning on a light in the shop, which removes the contrasting colours and depth. Director Giil Taws wanted to communicate the feeling of being in the moment and then having someone interrupt you. Armand has grown distant and indifferent to both the natural world and the people around him. The flattening draws the attention of the audience to his presence as a figurative "flattener" of his experience, one who radiates superficial flatness and misses out on the depth the world has to offer. As he progresses on the bicycle journey, the world will become richer through gradual introduction of 3D as he becomes more in touch with the world around him.

This is reflected in a later scene where Armand visits Fañch. "The old man is in his garden and there we show that time exists and we have this space and as soon as our character enters the space it flattens. He can influence the world of others." Fañch is a farmer and is framed as being closer to nature not only by his rustic, natural surroundings but again by 3D showing a greater depth of awareness of the world.

Taws describes this idea of 2D versus 3D as being reflective of how our relationship to the world can change in much the same way Armand's does.

Taws: "At the beginning of the script we have a character who is 2D and then the space becomes more 3D as the character grows. You can change your perspective. It's a change of relationship with the world, and 3D is a similar change. It is a world that guides the eye and not the other way around."

When asked about the limitations of 3D film Taws replied as follows.

Taws: "We were only shooting for three days so it is a short time to decide if 3D had limitations placed on this. Dual cameras were not that big a problem – it's just a tool and you have to know the tool. Dealing with two cameras, there were a lot of settings to be aware of. Joséphine and the other 3D experts say this a lot. You cannot shoot the same way in 3D and 2D. The way that the brain is working, the brain needs more time to reconstruct space and therefore shots have to be longer for the space to be understood better. It's not a limitation, it's a parameter."

Taws claims that the number of shots has been increasing in films for ten years and the opposite is true of 3D.

Taws: "3D fits perfectly with this film as it means taking the time to feel the world around you as opposed to Hollywood film that rapidly cuts between spaces and resists letting you get a feel for the world."

Taws was excited about the use of 3D in the film and discussed the decisions that must be made for the script in a 3D film.

Taws: "One of the first shots is him on his bike in the moonlight, he decides to leave in the night. How do we shoot this? He's on the bike on the shore and there is a lot of wind. How do you want to establish that? There was some discussion whether or not to use a wide shot to establish it. We always want to go from inside the world. Placing the camera far away is already outside of it. Placing the camera within and going from within is the best way. You have to go from within since this is a 3D film."

While 3D film has traditionally been very good at displaying scenic vistas, Taws found it was also good at intimacy and drawing a spectator into a character's personal space.

Taws: "The temptation was to make it a beautiful shot but we don't do this because we are with him and he doesn't see the beauty of what is around him. We know he's in this scene but we just write about him and focus on him on the bike."

Because the two cameras used for 3D film closely emulate how the eyes and brain work, the spectator tends to identify with the camera to a greater degree than in 2D film. Taws chose to reflect this idea in the direction of Armand's story by linking his character arc with the spectator's focus, which is afforded greater intimacy by 3D film. Taws also points out the renewed importance of sound in 3D film. The spatial component of sound is an important consideration. How complex will the soundscape be when we try to represent a three dimensional space? Sounds can be near or far and come from every direction which, in conjunction with the 3D image, creates a more organic experience. Armand experiences the world from a different perspective. Taws' plan is for the sound of wind on the road at the

beginning to always be the same sound and to become more complex over time to reflect the increase in visual depth.

Not all efforts in the shooting tests were successful. In one scene Armand lies on the beach after a comical bike crash. During the shoot, the camera zooms in on Armand, who blows it away from himself. The zoom was done with a Steadicam which revolves around and towards Armand's face. Taws felt that this effect didn't suit the theme of the film and distracted from the intimacy established in other shots. The Steadicam's quick movement through the zoom and the fact that it was only used for this shot in the test footage both contribute to a feeling that the film has shifted its tone. Taws felt that "nothing motivates this motion" and that it gave the audience the feeling of flying around Armand. It would seem 3D is not always appropriate for quick unnatural camera movements. Colour in the bike shop scene stood out as odd. The team used the contrast of the girl's red clothes to make her pop out of the scene and enhance the 3D effect, but the girl's red hoody is spotless although she has just been working on a bicycle, a messy task.

A concern about *Tro Fañch* was how comedy might work in 3D. Taws eventually learnt that *Tro Fañch* was not as much of a comedy as was originally intended. The bike accident scene in the test footage was not successful as slapstick humour, which prompted 3D consultant François Garnier to conclude that the 2D grammar of comedy may need to adapt to 3D.

Garnier: "The first thing with *Tro Fañch* was one of the wishes of the film director was for it to be a comedy, but a kind of extreme body comedy a little bit like Jacques Tati. And we saw that this overexpression of the body is really too much. Perhaps we have to find another way to move that's less expressive than in 2D. That was the first conclusion."

Taws stated that he has been inspired to pursue 3D film in his future work. "What I learnt about 3D has given me ideas and I have other projects I would like to do. I like that this [3D] is new and there are a lot of things that are fresh and dangerous."

While not an entirely successful test shoot, any mistakes made with *Tro Fañch* will surely prove useful as lessons for future 3D filmmakers.

Garnier: "It's a test, it's opened some doors, but of course it's not a perfect demonstration, it's one of the steps of the research."

Conclusions
All of the teams' test shoots and stories share some similarities, which lead to some conclusions about how 3D can enhance the stories of each of the teams' projects. Character closeness (or lack thereof), both emotional and physical, is a theme that is prominent in most of the films, as is their relation to the physical or natural world. 3D as a means of enhancing or distancing characters is common and can increase identification with a character or just enhance their physical presence. Both *La Reine du Sabbat* and *La Fille de l'Estuaire* try to align the experience of the main character with the experience of the spectator by bringing us into their space. *One and All* and *Tro Fañch* use 3D to describe the characters' physical and emotional situation rather than tie them to the spectator's experience of space. They use 3D more metaphorically than for purposes of identification.

Many of the test shoots use high contrast colour to highlight objects in the foreground and background. This is an established practice in colour theory to draw attention to an object and is used to highlight characters in *Tro Fañch* (Armand's daughter wears a red sweater to

stand out from her darker surroundings); *La Fille de l'Estuaire* (the girl wears blue to stand out from her mostly green surroundings and attention is drawn to the crashed car through a similar blue-green contrast); and *One and All* (the rugby players wear bright blue shirts and play on a grass pitch). While colour does help draw attention to the characters it can also draw attention to the uncanny nature of such clean contrasts, as in *Tro Fañch.*

In *La Reine du Sabbat* it is evident that shooting dark or low level lighting helps naturally to create depth through ambiguity and uncertainty of shapes within a scene. 3D is dependent on the illusion of space, and darkness blurs the distinction between different planes, allowing the spectator's mind to "fill in the gaps" and create a greater illusion of depth. *La Reine du Sabbat'*s test footage is perhaps the most grammatically fluent piece of 3D filmmaking to come out of CCFL. Agüero's rewrite to accommodate what was learnt in the 3D workshops paid off in the test shoot. As one unbroken cut that moves in and out of the church, the test shoot retains a clear creative direction throughout. The bodies of the girls dancing are particularly striking since the dance choreography is very slow, allowing the audience to more clearly see the musculature of the body in action. The surreality of the choreography, which often obscures the faces of the dancers and intertwines their limbs, increases the uncanny atmosphere the team were aiming for. The judge's voyeurism on this scene is literally reflected back on the spectator as he is always looking out from the background during the choreography, compelling the viewer to reflect on their own spectatorship. While it was written with 3D in mind, the language of the film is quite theatrical and highlights CCFL co-director Fabienne Tsaï's comments on choreography's relationship to 3D film.

Tsaï: "This interaction between vision, perception and movement also confirms one of our very first impressions: that it is impossible to consider stereography without also considering choreography; choreography of the body, choreography of the camera, choreography (spatialisation) of sound. The stereographic image implies a completely different relationship with space, time and depth, different frameworks, alternative movements created especially for this kind of writing, a circulation of other sounds and words. It implies that filmmakers aren't looking simply to 'tell' or 'outline' a story and the words spoken are not simply lines of dialogue. Actors must work in a different way, or rather they must relearn how to feel and perform because the viewer will not just be watching a film in Stereo 3D. He will be living and feeling it with them."

La Reine du Sabbat took the idea of choreography in 3D furthest. Dance is incredibly compelling in 3D, which has already been demonstrated by *Pina,* but here Agüero and his team have demonstrated the potential for physical choreography as a storytelling aid. The dance serves as an object of fascination to tie together the spectator and the judge's voyeuristic actions while also bringing the audience into the film spatially.

Slow shots, as Joséphine Derobe suggested, often work very well in 3D. Rapid editing and fast moving subjects are not as effective as everything in the film moving slowly with few edits. In *La Fille de l'Estuaire* and *La Reine du Sabbat*, moving backwards slowly is shown to be effective as it draws the spectator back from a start point to reveal the depth of the image as it passes by them.

While sound was not the primary focus of any of the test shoots there are some useful conclusions to be drawn and related back to Warusfel's research. *One and All'*s use of sound helped portray the idea of distance well. Distance is emphasised by clarity of the sound and the soundscape changes after the main character is tackled. In each test shoot, sound is shown to relate more intimately to what the protagonist of each film experiences rather than being a general soundscape. *La Reine du Sabbat* begins with the ambience of crickets in the night as the judge makes his way to the church but a slow, ritualistic rhythm

seeps into the soundscape as he witnesses the girls dancing in the church. It then returns to a near-silent ambience once the judge comes round to the front of the church and finds the girls have mysteriously vanished before he runs in fear from a young female churchgoer.

La Fille d l'Estuaire links Véfa's experience with the sound design as it closely follows what she hears near her as well as in her imagination, emphasising the more intimate spaces the test shoot captured. *Tro Fañch's* general focus was on 3D's metaphor for the protagonist's development of deeper relationships with his surroundings. However sound does not feature as prominently in the test shoot and is not closely linked to the protagonist's experience. Perhaps this linking of sound with 3D space is worth emphasising in future projects.

Pre-visualisation can be immensely useful when shooting 3D as many of the CCFL participants noted how much time it takes to calibrate 3D cameras, and that quick replaying of recently filmed footage in 3D is not always an option. Pre-visualisation software is something many of the filmmakers felt would be a great aid in pre-production, not just for planning scenes but for being able to get a sense of how a scene would look in 3D before spending setup time to find that a shot may not work. 3D animation is emblematic of these concerns because it requires pre-visualisation software to even begin animation; it is a necessary part of pre-production.

Pre-visualisation software allows a rudimentary demonstration of how a camera's movement through 3D might look so that less time is wasted doing practical tests, and experimentation is quicker and cheaper. Allowing filmmakers to change the virtual lens, sensor and 3D settings is preferable and the size and scale of objects would need to be highly accurate. The size of the screen the film will be projected on would also be useful information to consider. The pre-visualisation software discussion was a good meeting place for the creative and technical roles of 3D filmmaking as it unites both camps' concerns. While a stereographer may know intuitively how a shot might look in pre-production the software is useful for writers to better realise what is possible.

The filmmakers had not seen their test shoot material in 3D until late in post-production and in some cases until the final screening of the test footage. This is the other side of a problem which is that 3D cannot be shot and then immediately viewed in 3D or at least the capability of this was not available to the crews working with CCFL. Not being able to view a take in 3D on set is an obstacle to iterative filmmaking and either requires workarounds (as in the form of pre-visualisation software) or the necessary equipment to do so. This is especially tricky when the size of the screen the film is eventually shown on is highly relevant to whether or not the film will be successful. 3D tends to benefit from the screen taking up much of the spectator's peripheral vision so that the edge of the screen does not reduce the depth effect as is the case in "window violation". The solution may be to allow time to have test footage screened more frequently on a large 3D screen during the production of the film.

There is a split between the idealistic vision that native 3D should be the default for 3D film as opposed to shooting in 3D or 2D and then fixing the 3D effect in post-production. Among the filmmakers discussed here, opinion is divided on whether a film necessarily needs to be shot in 3D or later converted in post-production. Many of the CCFL workshop participants were interested in 3D films as an artistic medium yet this did not detract from the financial concerns of 3D, especially in an arthouse space. It is not especially more expensive to shoot in 3D as opposed to 2D, with some of the budgets for the projects behind the CCFL test shoots being well below the low-budget goal of 5 million euros. What is perceived to be expensive is the risk of 3D at the box-office. Henry Davies felt that audiences simply view 3D as a gimmick and the expense of tickets to see 3D films is evidence of an attitude that 3D

is more expensive or valuable. While 2D can cost just as much to film as 3D, the general attitude of mainstream producers is that it is simply not worth the risk, especially when the film is exclusively 3D. More work needs to be done to communicate to executive producers that 3D is doable on very low budgets and to audiences that 3D is not simply a tool for the emphasis of spectacle. It is inevitable that arthouse work of any kind will be produced for a niche audience but this audience needs to know how 3D can enhance their experience. It may also be beneficial for 3D filmmakers to look for other venues outside of the cinema to display their work. Most of the filmmakers and producers working with CCFL expressed concern that lower budget 3D films could not do well financially having to compete for cinema space.

Revisiting the Hypotheses
In summary it is worth reiterating the original hypotheses and presenting the key conclusions.

1. ***"Giving writers and directors a greater understanding of both the creative potential offered by, and the restrictions associated with, shooting in Stereo 3D, and in parallel, giving technicians a stronger understanding of the requirements of story, will lead to the development of stronger narratives and more compelling and distinctive application of Stereo 3D in feature films."***

The CCFL brought writers, directors, producers together into workshops to meet with technical experts and script consultants to share information with the goal of discovering how to make a film specifically for 3D.

The 3D projects selected by CCFL have all shown varying degrees of success in their test schoots and even the mistakes made have still been valuable learning opportunities. One thing is certain, that the filmmakers who are interested have opportunities now that they didn't have before. Technology for filming in 3D is more readily available and there is growing interest in how to push 3D further than its typical implementation in Hollywood. Le Bos in particular sees the technological move forward alongside a desire for something new from audiences and creators alike.

Le Bos: "In terms of technology it's becoming very clear that it can be much cheaper to shoot in 3D now the equipment has reached a point of maturity which wasn't there four years ago. In terms of mainstream cinema, the signals we receive from Hollywood seem to say it's getting tough for 3D in mainstream big-budget cinema and I think that now it's the moment for people that are more into exploring new poetic possibilities for cinema and exploring new sensations for the viewers. It's the moment where arthouse cinema can take over after mainstream in order to open new doors, and which can only be opened by small crews with intimate subjects with technologies that now can allow for intimacy to be explored with 3D, which wasn't possible five years ago. So it's really technological researchers and filmmakers ready to discover new possibilities – these put together are opening the possibility for cinema to become a deep source of amazement again."

The opportunity is there for small teams with relatively low budgets to film in 3D and the task now is sharing information. The consultants who worked with CCFL were glad to give their experience of 3D filmmaking to new and interested filmmakers. Established stereographers like Derobe and Garnier both valued the process not only as a learning exercise for those new to 3D but as a collaborative effort to see what new directors might do that they had not considered.

Derobe: "I think it's really, really precious that it could give the opportunity for them to better understand this medium and discover things they like and don't like, and we are at this stage."

Garnier: "For us it was very interesting to see what worked and what didn't work in front of our expectations."

Le Bos recalls how in 2013, the Lab was structured so that the CCFL filmmakers would learn Stereo 3D theory and then go on to shoot test footage. While this approach worked well, the consultants learned in the next year that giving filmmakers the opportunity to shoot the test footage first and then allowing the screenwriters and directors a chance to think about how they would do it differently afterwards helped give them a practical understanding upon which to build.

La Reine du Sabbat was emblematic of what happens when a filmmaker unacquainted with the technology collaborates with experienced stereographers. Agüero followed advice from the stereographers he worked with very closely. *La Reine du Sabbat* reflects this as Agüero made sure to understand the best way to film something in 3D and then structure his idea around it.

Davies had trouble during the filming of the *One and All* test shoot and some struggles will always happen when attempting something for the first time. The happy accident of the rugby players' physical vulnerability arose from a contrast between Davies' original intention and how 3D makes the human body appear.

In *La Fille de l'Estuaire*, Denis' concentration on a variety of textures and spaces alongside the internal world of the main character in the test shoot showed how the team tried experimenting with a variety of ideas. The test shoot likewise produced differing levels of success. However, a desire to experiment was clearly instilled by what Denis and her team had learnt during the workshops. Each of the four scenes set out to achieve something different technically yet all still tie back to the original idea of placing the audience in the world of the girl.

Tro Fañch produced two major lessons about writing with 3D in mind. Firstly that the technical research that exists around 3D indicates that traditional physical comedy is not as effective, and so a new comedic language might be needed for 3D. And secondly that playing with space should be encouraged. The most successful scene in the test shoot (the girl in the bike shop) made the most effective use of colour and depth to communicate: a still scene where the girl sits in silence before being brazenly interrupted by her father, dispelling the sense of quiet space.

Sound, colour, choreography, 3D technology and storytelling have come together in each project and have presented many directions in which 3D can be taken forward. In spite of, and perhaps even as a result of, the challenges involved, the shooting tests demonstrated that by giving writers and directors a greater understanding of both the creative potential offered by, and the restrictions associated with, shooting in Stereo 3D, and in parallel, giving technicians a stronger understanding of the requirements of story, this can lead to the development of stronger narratives. We are yet to see whether more compelling and distinctive Stereo 3D in the feature films under development will emerge, but the screenplays and treatments produced during the Lab demonstrate greater potential for its use, in conjunction with the filmmakers' increased knowledge of the medium.

2. "Stereo 3D offers the potential to add a fresh dimension to stories that involve physicality and nature – themes that have not yet been fully explored within this medium."

Two major conclusions can be drawn with regard to this second hypothesis.

Firstly, physical intimacy was a good theme for the projects. The recent developments in 3D technologies allow for more portable 3D cameras that can more easily film subjects in close-up, and tying the spatial nature of 3D to the characters' perspectives on the world combined to produce useful and interesting results. Character vulnerability was a common link between the test shoots which stemmed from the themes (of nature and physical intimacy) and the use of 3D to signal relational depth; whether the character related to a certain space or their emotional relation to the things they perceive.

Best: "We thought it would probably be interesting to explore nature and how that appeared in Stereo 3D, how you might edit differently in Stereo 3D and also intimacy and how bodies move through a space. Having seen Wim Wenders' *Pina*, it seemed like there was some really interesting stuff to explore now that the cameras could get in closer."

The second conclusion to this hypothesis is that theatre and stage direction theory may be worth incorporating for 3D film going forward. Something that the consultants noticed when watching the test shoots is that some of the more successful shots had a more theatrical than cinematic grammar because of the long shots and spatially mapped choreography of certain scenes. This can be seen very clearly in *La Reine du Sabbat.*

Garnier: "It's in some ways a little bit of theatre and it's very interesting to see how this spatial medium is connected with theatre perhaps sometimes more than with cinema. We also see the spacialisation of the [3D] picture, reconnecting the cinema with the theatre."

Best: "There was a sense of how Stereo 3D cinema has more akin to theatre in some ways. So it's really about thinking about choreographing that space, how the characters move through the space and how we might think about creating a cinema piece in the way we would approach theatre. And *Reine du Sabbat* is a great example of that."

Le Bos: "We've also been discovering a new way to conceive the mise-en-scène. It can result in a very unique physical experience. It's been proving very clearly that the project had a very deep potential to enhance what 3D can generate for arthouse cinema."

This conclusion also echoes back to Tsaï's comments about choreography. Physicality, like that seen in *Pina*, was clearly an inspiration to several of the filmmakers. Several of the consultants noted the physical space of 3D being very similar to how space works in dance choreography or theatre. Each of the test shoots' most successful portions were during close-up shots of a body in a space. *One and All*'s focus on the physicality of the game of rugby, intended to portray rugby players as heroic bodies, added an unexpected empathy to their vulnerability. *La Reine du Sabbat*'s focus on dance choreography while moving slowly through the tunnel-like space of a church creates an eerily intimate space which draws the spectator in.

Some test shoots were successful, others less so, but all provided some useful lessons to be learnt for future 3D filmmakers. Collaboration with stage directors and dance choreographers may be a fruitful path for 3D in the future, and physical and natural themes were and are a fertile ground for 3D to explore. Areas ripe for further narrative exploration

include the relationships between sensuality, nature, movement, exploration and discovery, unfathomable mystery; intimacy, visual and hearing acuity, touch and caress, gripping and grabbing, kinaesthesia and synaesthesia; spontaneity and survival instinct; space and time instead of frame, what is scene and what is beyond and around: the visible and the invisible; embodiment and engagement of audience, experience and irrational emotions.

Interviews
Pablo Agüero, writer-director *La Reine du Sabbat*
Pippa Best, CCFL co-director and script consultant
Estelle Car, CCFL project co-ordinator
Henry Davies, director *One and All*
Mary Davies, CCFL co-director and script consultant
Nicolas de la Mothe, producer *La Reine du Sabbat*
Gaëlle Denis, director and co-writer *La Fille de l'Estuaire*
Joséphine Derobe, stereographer and Stereo 3D consultant
Ohna Falby, producer *La Fille de l'Estuaire*
François Garnier, Stereo 3D consultant,
Antoine Le Bos, CCFL co-director, script consultant and screenwriter
Denzil Monk, producer *One and All*
Giil Taws, director and co-writer *Tro Fañch*
Fabienne Tsaï, CCFL co-director and 3D producer

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