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In Between

Manipulated Pâte de Verre

Dissertação para Obtenção do grau de Mestrado em Arte e Ciência do Vidro

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Abstract

All of us are in between.

Any artist is living in between. On one side an artist is part of the society as someone normal living a life not different to anybody else, who eats, loves, feels and communicates with other people about things that happen every day. On the other side any artist is observing every single motion of others. She/he sees the surrounding by all her/his senses in an active and passive way. All this information she/he is getting constantly without even thinking about how to get it. It makes the brain work permanently, even when it seems that she/he is having that normal live mentioned above. Her/his brain is already using all this inspiration in a creative way combining the motions, colors, shapes and lines, sounds and fragments of words and when the time comes the artist's hands will do the job of creation without thinking how to visualize it for others.

This is the way I am working/I am living as an artist. I tried to divide my approach into three dimensions which are the poetic, the scientific and the artistic, to give a proof that being 'in between' - not only during my glass art and science studies in Portugal - can be a mental state that artists and scientists have. This mental state is leading us to further development, progress and creativity for a society, my experiments to answer this main question were influenced by Einsteins theory of relativity, which did change mankind's thinking about small (particles) and big (universe) at the beginning of last century, by Portuguese history and literature, by art history and by the material itself: glass made in *pâte de verre*.

The first proof of Einstein's mathematical theory of space and time from 1916, better known as theory of relativity, was possible in May 1919 on the Portuguese island of Príncipe because of a solar eclipse when measuring stars close to the sun^[1]. Since then we know that Einstein's mathematical theory was correct. It results into wave and particle duality and that is one part of my *pâte de verre* experiments.

In the poetic field I was highly influenced by Fernando Pessoa's life, literature and his construction of heteronyms. In my research I could find out how he was living 'in between' and how his poems reflect that mental stage.

My *pâte de verre* experiments - the artistic dimension of 'in between' - did bring me further and further away from what is usually made with this kind of method and I could find my own level – I call it *manipulated pâte de verre*.

The final result bringing the three dimensions together was seen at my glass exhibition taking place at the Algerian Embassy in Lisboa ^[2] and at the Faculty of Fine Arts in Universidade de Lisboa.

1 Seeds, Michel A. / Beckman, Dana (2012): *Foundations of Astronomy*. Cengage Learning Boston. 12th edition. p. 97

2 which can also be see as a location 'in between' (extraterritoriality)

1. Introduction

The topic of this master's thesis was not as freely chosen as when I was just studying art, free arts. For glass art and science studies it needed to include not only a scientific part of the glass as material but also a wider view on science. I did choose one which goes beyond that and shows one of the biggest changes in mankind's thinking and knowledge about matter, about the smallest structure smaller than the atomic structure and bigger than our knowledge of the entire universe.

1.1. Personal Interest

The topic for my masters' thesis 'in between' originated in a feeling I am having as an artist and which was constantly part of my life. One can just live with it or one can try to find a definition what it really means by using sciences and by comparing it with possibly similar feelings other artists might have or had. I wanted to understand that this feeling is not only typical for artists but also for scientists.

In my artistic life I did always try to use my knowledge for new experiments that had not been tried before and then I am sharing it with people from different cultures and nations. Doing experimentations made for the first time, makes you meet people who just wonder what you are doing, others will say “that way it will never work” or “better follow the rules and it will work”. For me art is always about communication. Here it should be communication between known and unknown. First idea people might have about my 'in between' could be the difference seen by first view. I am from another country, my mother tongue is different, my cultural heritage is different, I am from Sahara desert. Being in Europe since almost 20 years now and living in different countries, in some for a few years, in others for a few months and still being back home for many months every year makes my life 'in between' concerning its location. My life is 'in between' concerning my thinking and all this is a constant source of creativity. It is 'in between' regarding the subjects I am working with. It is art, it is design, it is science.

Living in this boiling *melange* of cultures, of religions, of arts (in the classical age understanding [3]: grammar, rhetoric, logic, arithmetic, geometry, music and astronomy [see figure 66 on page 71], of handcraft (in the medieval age understanding of mechanical arts or later called applied arts to show the difference to fine arts of the upper class, which was already mentioned by Seneca (1-65) “*Quare liberalia studia dicta sunt vides: quia homine libero digna sunt.*”[4][5]) and constantly changing art definitions could give an idea why the master studies of glass art and science did bring me to this topic and to answer the question what 'in between' means; for me, for artists, for scientists. Even though this is a very personal question, I will try to answer in an objective perspective. If the answer could be understood by someone not knowing yet what this vague 'in

3 Capella, Martianus (5th/6th century): *De nuptiis Philologiae et Mercuri*, [De septem disciplinis. encyclopedic work]

4 Seneca, Lucius Annaeus: *Epistula LXXXVIII* from Knox, Vicesimus (1824): *The Works of Vicesimus Knox*, D.D, Volume 4, London, printed for J. Mawman, p. 129

5 my translation: *you see why the liberal arts are so called: they are studies worth a free born man*

between' means, it could be a small step to make that person understand art and to make him understand science with its permanent research to answer new questions.

My art's messages are generally coming from a deeper inside. If someone does not know yet what this 'in between' includes and the logical explanation of this thesis' chapters about it will not bring him any further, I hope just seeing my final exhibition's glass art will bring her/him closer to an understanding; in that case the goal is reached by touching his unconscious.

For me as a glass artist, glass through time and action/reaction is an interesting subject, it is a question about meaning and purpose; in the beginning any artist has to understand the material. I will try to understand the *pâte de verre* glass from its chemical components to a single grain further to the final object. It is 'in between': it is an example between solid and fluid, it is fragile and solid, and fused but it is not fused completely.

In one side I hope there will be a high correlation between my visual work and the topic of this thesis as there is in the material itself. The other side will be seen later by its message.

1.2. Development

There had always been scientists whose knowledge was centuries beyond their time and even contrary to contemporary schools and leading scholars. They lived in between. What a hard life for Galileo Galilei (1564-1642), when everybody else disputes his knowledge. What a life for Leonardo da Vinci (1452-1519) who is nowadays still seen just as a painter by majority of people. Other leading scholars like Ibn-Sīnā (980-1034) are known in the western world, but just a few of his works were known and translated; the wide range of that scholar's knowledge got lost in other cultures and he became just known as a specialist (physician).

How were Albert Einstein's (1879-1955) mathematical theories impugned before they could be proofed, because all former scientific knowledge like Isaac Newton's (1642-1726) or Nicolaus Copernicus' (1473-1544) had to be rethought.

I did remember a book I read after my first walks through Lisboa. The first time when my mind was collecting the very first visual and acoustic impressions – the ones I call essential and sustainable for me as an artist, because I still feel myself not influenced yet - bringing me from one corner to next backyard but never reaching the places people did recommend walking around, not having a map or guide just following my intuition; Fernando Pessoa's 'The book of Disquiete' [6]. For me it did give a view on a former Portugal but mostly a strange impression about the author when reading verses of poems for the first time. Next time and in full length combining all these impressions I was gathering, he (Pessoa) was gathering or just collecting in his brain, which is of course a whole universe of itself just as mine, and did bring to paper. It was the normal world we are living and we can preserve it for others in books, in art or in movements. I did remember, that these thoughts did once lead me to design an exhibition card [see figure 67 on page 71] by adding my *pâte de verre* object of 32 cm diameter in different colors with partly added glowing powder (self glowing under and after UV-light exposure) into

6 Pessoa, Fernando (2002): *The Book of Disquiet*. edited and translated by Richard Zenith. Penguin Classics. UK

a magnetic resonance image of a human head (right side). As the way of any research is always limited by guidelines when not being able to work completely free, some of my *pâte de verre* objects were called *passage* [see figure 68 on page 72] and I already tried to visualize my thoughts about the universe in 2014 [see figure 69 on page 72].

1.3. Question

This thesis' research will try to answer the question what in between means and if living in a stage 'in between' could be a constant source of creativity not only for scientists, but also for artists?

I did find myself in vicarte in Portugal studying glass art and science. Which Portuguese is an excellent example for that mental stage? Fernando António Nogueira de Seabra Pessoa. Nowadays known worldwide, almost not published during his lifetime. His poems did lead me further to understand 'in between'.

When we think about science it is generally thought about hard sciences. Of course glass art and science includes soft sciences too. I will try to integrate psychology and sociology into my research about 'in between'. A few poems did guide me, a few artists did visualize before what I am trying to write about, some philosophers did research about.

I will try to make the reader understand that glass with its different states of matter is 'in between' by visualizing this through my art and bringing scientists' and authors' ideas, which were influencing me, to an easier understanding. My art has always an educational part, my exhibitions follow the ancient storyteller's rules to bring knowledge, excitement, understanding to the visitor. The visitor, moving from one object to next, learns by lessons leading her/him to the final point whether she/he understands it consciously or unconsciously. My glass art has always been about communication; in this case it is communication with the world of literature, culture and science.

This thesis is my story to bring 'in between' closer to the reader and answer the question if one can find a clearly and scientifically proof answer what it really is and what the benefit of this state is.

2. Arts and Experimental Craft

“The most beautiful thing we can experience is the mysterious. It is the source of all true art and science.” Albert Einstein [7]

My goal will be to bring a little lucidity into the mysterious; but just as much that it still stays mysterious and will raise new questions. The word itself 'mysterious' implies that no final answer can be found. My point of view is influenced by my heritage and knowledge at the beginning of my research. During my research I was diving deeper into a world not discovered yet by myself.

I did divide my research of 'in between' into three parts. I call them dimensions because they might look as clearly defined parts only from one point of view and each part alone can just be incomplete. Because it is a complex view they do interfere with each other, so the name dimensions seems better. From a different angle one gets a different view. All dimensions form the whole, which is again just a part of what we do not know yet.

2.1. Three Dimensions

2.1.1. Poetic Dimension

Arriving to Portugal for the very first time I was roaming through the streets of Lisboa coming across a small place with a café close to a statue inviting me to rest. Sitting there next to Fernando Pessoa [see figure 1] in Chiado I just knew that he was an author. That moment I did not know how much he would influence my years in Portugal.



figure 1: *A Brasileira* (1988) by António Augusto Lagoa Henriques (1923-2009)

7 Robson, John M. (1987): *Origin and Evolution of the Universe: Evidence for Design?*. McGill-Queen's University Press. Kingston. p. 273

What a difference: One century earlier he was not known and now everybody wants to be close to him. Reading some of his poems, fragments of words stayed in my mind: “*WE ALL HAVE TWO LIVES*”. Reading about Fernando António Nogueira de Seabra Pessoa's life I started to be curious about him and discovered similarities that will be mentioned here later in detail.

The following poem did guide me through my thesis' research and it might function as a line here to my reader:

“Typing (Datilografia)

Alone in my engineer's cubicle, I draw up the plan,
Sign the project, cut off here,
Far even from who I am.

Next door, in dully sinister accompaniment,
The noisy clacking of typewriters.
How sick am I of life!
How lowering this routine!
What a come-down to be like this!

Long ago I was someone else, there were castles and knights
Long ago when I was true to my dream,
There were great Northern landscapes overdone with snow,
There were great Southern palm groves flush with green.

Long ago.

Next door, in dully sinister accompaniment,
The noisy clacking of typewriters.
**We all have two lives:
The true, the one we dream of in childhood,
And go on dreaming of as adults in a substratum of mist;
The false, the one we live when we live with others,
The practical, the useful,
The one where we end up by being in a coffin. [8]**

In the other there are no coffins, no death,
Only childhood pictures:
Big coloured books to look at but not to read;
Big pages of colors to remember later.
In the other we were us,
In the other we are alive;
In this we shall die, which is what living means;
This moment, by feeling sick, I live in the other ...

But next door, in dully sinister accompaniment,
The voice rises, the noisy clacking of typewriters.” [9]

8 original not bold

9 Pessoa, Fernando (2009): *The Collected Poems of Álvaro de Campos*. Vol. 2 (1928-1935) Translated by Chris Daniels. Shearsman Books Exeter. p. 137

Reading Pessoa's poems was a little confusing in the very beginning. Sometimes different authors appeared. I found out that these were not different authors. Just different names of authors. Actually they are all the same, him, Fernando Pessoa. He is calling these pseudonyms heteronyms. They all have in common a similar mood as one can find in fado, one might feel when walking old town of Lisboa and listening to the melancholic sound.

Pessoa is writing about one of his heteronyms in a letter:

“Álvaro de Campos was born in Tavira on October 15th 1890 at 1.30 pm. He had a normal high school education; and was later sent to Scotland to study Engineering, first mechanical, then naval. A holiday trip to the East resulted in the Opiário. An uncle from the Beiras region of Portugal, who was a priest, taught him Latin. Vaguely Jewish-Portuguese, pale olive skin, straight hair, usually side parted, wore a monocle.” [10]

Each of these pseudonyms does not fit postmodern movements like the idea of deconstruction of authorship to be found in postmodern movements like the French philosopher Michel Foucault's *“The Theorist”* or his philosophical and historical essay *“Les Mots et les choses. Une archéologie des sciences humaines”* on history of science and epistemology from 1966. Foucault explains the function of the author in *“Qu'est-ce qu'un auteur?”* [11]. Usually it has four characteristics: The first (*le nom d'auteur*) authors have a relation to their texts which are usually called authors' rights like copyright and what they write is protected for years. The second (*le rapport d'appropriation*) is the autonomous function, which specially is important in scientific publications. Scientific texts without an author are not valid. But this autonomous function does not apply all times. In the Middle Ages it was common that literary texts were not named. Nowadays it is the opposite. The auto-function is the third: (*le rapport d'attribution*) It is the result of a construction which the reasoning author creates. The author is the one by which the peculiarities and changes in a work can be explained. One can give the author a certain unity of writing in his works. From these, contradictions can be solved in various texts of the author. The last feature (*la position de l'auteur*) of the auto-function is, that a text, while pointing to the author by means of personal pronouns and adverbs of time and place, shows these references in discourse with auto-function but unlike in those without. Pessoa's heteronyms do not fit Foucault's categories. They are 'in between' these.

The poet Álvaro de Campos is the author of 'Datilografia'. He is using long phrases and is not looking at rhythm and rhymes in his poems; he was a student of Alberto Caeiro who was called the master; his opponent was Ricardo Reis, who accused de Campos of having a bad practice not following the rules of poetry. Another member of this Lisboa located poet community - in one life - in the other there existed a real poet community who used to meet in that still existing café - is the Portuguese poet Alexander Search, who is using the English language for his poems. For a reader this constellation and the relations they have to each other might be confusing; but it is not confusing, they all are pseudonyms of Fernando Pessoa, the first modern poet of Portugal. He was born in

10 URL: <http://casafernandopessoa.cm-lisboa.pt/index.php?id=4291&L=4> 08.09.2016

11 Foucault, Michel (1969): *Qu'est-ce qu'un auteur?* Bulletin de la société française de philosophie, 63e année, no 3, juillet-septembre 1969

Lisboa in 1888, did grow up in South Africa bilingual, because his stepfather was the Portuguese consul there. He did come back to Lisboa with thirteen years and he lived there until his death in 1935. He worked for an American mercantile information agency and was not known as a poet. Pessoa lived close to poverty but had time for his work as a poet.

“Shortly after Pessoa died in 1935, more than twenty-five thousand of his unpublished items were discovered in a trunk in his apartment, and it is chiefly from these manuscripts, along with many others discovered subsequently, that his reputation and his personae have been build.”^[12]

Furthermore, he lived far away from main European artistic currents of that era giving him the opportunity to develop his own style.

I did see similarities to my life. Remembering South Africa. Communicating in different languages with people having the same linguistic skills and using single words from another language within the main language for communication just because a single word in that language can explain my idea better than a few words in the main language. But I did see opposites. No desk clerk's job is affecting my creativity. I am not stuck geographically. That is a benefit of last century's progress concerning mobility and modern movement between the cultures. And as last: I am me.

“Pessoa regularly referred to “himself” in the third person – perhaps because, like the heteronyms, the writings signed under his name represented a dramatic personality rather than a historical subject. Nowhere does he state this fact more clearly than in a fragment he wrote on being Portuguese: “O bom português é várias pessoas ...[!] Nunca me sinto tão portuguesemente eu como quando me sinto diferente de mim – Alberto Caeiro, Ricardo Reis, Álvaro de Campos, Fernando Pessoa, e quantos mais haja havidos ou por haver.” [The good Portuguese is various persons ...[!] Never do I feel so Portuguese as when I feel that I am different from me - Alberto Caeiro, Ricardo Reis, Álvaro de Campos, Fernando Pessoa.]”^[13]

My research about Pessoa and his critics did bring me closer to a newer author, a recognized author, who did get the Nobel Prize, and he was a critic of Pessoa too. What I found in one of his poems did show also this vague 'in between': Octavio Paz (1914-1998).

12 Sadlier, Darlene Joy (1998): *An Introduction to Fernando Pessoa: Modernism and the Paradoxes of Authorship*. University Press of Florida. Gainesville. p. 8

13 Sadlier, Darlene Joy (1998): *An Introduction to Fernando Pessoa: Modernism and the Paradoxes of Authorship*. University Press of Florida. Gainesville. p. 7

Octavio Paz

Between Going and Coming

Entre irse y quedarse

Between going and staying the day wavers,
in love with its own transparency.

Entre irse y quedarse dude el día,
enamorado de su transparencia.

The circular afternoon is now a bay
where the world in stillness rocks.

La tarde circular es ya bahía:
en su quieto vaivén se mece el mundo.

All is visible and all elusive,
all is near and can't be touched.

Todo es visible y todo es elusivo,
todo está cerca y todo es intocable.

Paper, book, pencil, glass,
rest in the shade of their names.

Los papeles, el libro, el vaso, el lápiz
reposan a la sombra de sus nombres

Time throbbing in my temples repeats
the same unchanging syllable of blood.

Latir del tiempo que en mi sien repite
la misma terca sílaba de sangre.

The light turns the indifferent wall
into a ghostly theater of reflections.

La luz hace del muro indiferente
un espectral teatro de reflejos.

I find myself in the middle of an eye,
watching myself in its blank stare.

En el centro de un ojo me descubro;
no me mira, me miro en su mirada.

The moment scatters. Motionless,
I stay and go: I am a pause. [¹⁴]

Se disipa el instante. Sin moverme,
yo me quedo y me voy: soy una pausa. [¹⁵]

Octavio Paz is speaking like someone who is lost. In the beginning he tries to decide but in the end he is not moving. For my understanding he was really privileged, having a university education and a job as a diplomat to bring him to many countries, to let him pick up various philosophical currents of the time. He was influenced by surrealism, first time during the war (2nd world war) in Mexico City.

“Le Surréalisme fut surtout un mouvement de poètes et de peintres. [...] Ces gens, au fond, mènent une quête très ancienne, ils cherchent une réconciliation entre le macrocosme et le microcosme. [...] Et alors j'ai découvert que le surréalisme n'est pas seulement une révolution, comme Breton l'a cru au commencement, mais, comme il l'a vécu ensuite, que le Surréalisme est une tradition.”^[16] My translation: [*“Surrealism was above all a movement of poets and painters. ... These people, in fact, lead a very old quest, they seek reconciliation between the macrocosm and the microcosm. ... And then I discovered that*

14 Weinberger, Eliat (1991): *The Collected Poems of Octavio Paz*. 1957-1989. Edited and translated by Eliat Weinberger. New Directions Books. New York. p. 507ff

15 id. p. 506

16 Paz, Octavio (1998): Octavio Paz parle du surréalisme: entretien avec Dominique Rabourdin (Mexico, mars 1996). *Trois cerises et une sardine*. n°5, septembre 1998

surrealism is not only a revolution, as Breton thought in the beginning, but, as he then lived, that Surrealism is a tradition.”]

I will pick up Paz' thoughts about surrealism and the reconciliation between the macrocosm and the microcosm in the following chapters scientific and artistic dimension with a view on the method I am using – *pâte de verre*.

We look at Octavio Paz as an intellectual author who was able to communicate. What a contrast to 'I am a pause'. What a contrast to Fernando Pessoa who had to survive as a desk clerk, who just had his few intellectual friends in the later called Orpheu group somehow at the far edge of European cultural currents of the time he lived. Octavio Paz had his doubts too. Not as strong as Fernando Pessoa's heteronyms which sometimes even seemed close to a suicidal mood or even committed suicide [17]. Paz had its doubts about our modern societies - about how I did call it long ago in a series in my art work *the end of art*, which was of course a question to deny - asking himself about future of printed art and if we look at that in a wider view he asked himself what will be left of intelligentsia when television program have more success than printed literature. Octavio Paz stated that poetry “ [...] *has become an art on the margins of society. It is the other voice. It lives in the catacombs, but it won't disappear. [...] [Poetry acts like] critique of consumer society.*”[18] This small statement, specially the word catacombs, did lead me to Carl Gustav Jung (1875-1961), who did do his research about dreams. We should always come back to the initial poem 'Datilografia' and the two lifes. The true, the one we dream and the false, the one we live.

Each of Pessoa's heteronyms had its own past, present and future, its own character, its own appearance visible for the reader and similar for readers of that era. Each had its world. Pessoa could divide, he could separate them. Octavio Paz was living in the middle and at the end of the same century with a huge increase of knowledge concerning our world and universe. In his speech at the Nobel Banquet in 1990 he was referring to this as a vast system or even a network of systems.

“[...] Just as we are beginning to unravel the secrets of the galaxies and the atomic particle, as we explore the enigmas of molecular biology and the origins of life [...] Stars, hills, clouds, trees, birds, crickets, men: each has its world, each is a world, and yet all of these worlds correspond.”[19]

The narrator of 'Between Going and Coming' is stuck at all these crossroads. Paz' speech at the Nobel price banquet tries to show not only the 'in between' we are living in, but also the revolution which could be characterized as a revolution in terms of science we are facing since Albert Einstein's theory of relativity and its consequences for all sciences and like that for all parts of human life. Looking backwards to the time before – actually to the time from Newton to Einstein, or from ancient Greek times to the beginning of last century concerning the seven liberal arts (Latin: *artes liberales*) and the mechanical arts (Latin: *artes*

17 Alameddine, Rabih (2011): *The Book of Disquiet* in Pen America: A Journal for Writers and Readers Issue 14. Pen America Center, New York p. 77

18 Paz, Octavio (1971): *Declaraciones del Primer Congreso Nacional de Educación y Cultura*. Case de las Américas. p. 65f

19 Paz, Octavio (1990): http://www.nobelprize.org/nobel_prizes/literature/laureates/1990/paz-speech.html access on 05.08.2016

mechanicae) let us think in a nostalgic way to a time when all seemed more clearly and easier to understand.

The more I am trying to make this 'in between' understandable, for me and for the reader new questions arise. Learning our mother tongue, going to school, learning about our society, our nation we might come to the false conclusion that all is a permanent construction. Looking a bit further we see another nation with another language, another functioning society. It is possible to understand the others because of knowledge of languages or because of the help we get by translations.

We are trying to understand life from our first point of view. We try to understand it by comparing this with our parent's points of view; they did try to bring us close to well-known people who published their thoughts about the world. We come in contact with people like Immanuel Kant (1724-1804), Karl Marx (1818-1883), Sigmund Freud (1856–1939). According to the French Philosopher Paul Ricœur (1913-2005) the last two (and Ricœur is including the German philosopher Friedrich Nietzsche (1844-1900)) these are reductionists; he calls them *maîtres du soupçon* (masters of suspicion)^[20]. So they look at the world just from their point of view.

Furthermore their ideas are translated, were published in different cultures and this is also a problem. The problem I came across in my life when learning vocabulary instead of picking up new words in a foreign language by the situation itself.

Octavio Paz is writing about translation: “*Thanks to translation, we become aware that our neighbours do not speak or think as we do.*”^[21]

For him it is a paradox that a translation tries to leave the differences between languages behind but it actually shows the differences. For someone speaking several languages this means that he is thinking in different ways – in contrary ways and the next question is how our mind can make it 'in between' these. This constant battle might be the source of progress and creativity. It is not bringing us to a life of harmony one might be looking for when accepting the status quo, when trying to maintain the things as they are. This status quo is nowadays used a lot with just these two Latin words; it is part of the Latin phrase “*in statu quo res erant ante bellum*” saying exactly what I mentioned before: 'Keeping that state in which the things were before the war' and in my case meaning the inner war.

Could this have been a mental state for Fernando Pessoa too, because he did grow up in more than one country? Octavio Paz did ask the following question about him:

„Anglomaniac, myopic, courteous, evasive, dressed in black, reticent and familiar, cosmopolitan who preached nationalism, solemn investigator of useless things, a never-smiling humorist who chills our blood, inventor of other poets and destroyer of himself, author of parodies clear as water and, like parody, dizzying: to fake is to know oneself, a mysterious man who makes no effort to cultivate mystery,

20 Ricœur, Paul (1970): *Freud and Philosophy: An Essay on Interpretation*. Translated by Denis Savage. Yale University Press. New Haven and London. p. 32ff

21 Paz, Octavio (1971): *Translation: Literature and Letters*. in Schulte, Rainer / Biguenet, John (1992): *Theories of Translation: An Anthology of Essays from Dryden to Derrida*. University of Chicago Press. p. 154. from Paz, Octavio (1971): *Traducción: Literatura y Literalidad*. Barcelona, Tusquets

mysterious like the moon at midday, taciturn ghost of the Portuguese noon, who is Pessoa? “ [22]

Even describing him with this question Fernando Pessoa is still a person hard to describe; Octavio Paz tries to answer by explaining that Pessoa in Portuguese means person. It brings associations with an actor's face mask, *personae* [Latin] means person, but also the characters in a play, novel, etc. and is according to Carl Gustav Jung (1875 - 1961) (in the psychology of C. G. Jung) the mask or *façade* presented to satisfy the demands of the situation or the environment and not representing the inner personality of the individual; the public personality (contrasted with anima)[23].

“The roles individuals assume are much like C.G. Jung's concept of the persona, which is defined as the mask people wear [...] The persona is the public self, the side one displays to the world, and in some senses the social facade. [...] it is sometimes assumed that people are not "being themselves" in various social situations, but are merely "playing out a part. “ [24]

Some words stayed in my mind: Two lives. False. Dream. What does Pessoa want to say when talking about childhood? Álvaro de Campos' childhood? His childhood? Portugal's childhood? Mankind's childhood? Later it is this 'substratum of mist'. How can I find scientifically proof answers to my thesis' questions in this substratum of mist? By looking at Carl Gustav Jung's answers concerning dreams, which are universal. But answers concerning dreams began earlier: The Greek philosopher Plato, who lived from 428-347 B.C. was the first known to think about if life is but a dream. He believed that there is another world existing behind our world of our consciousness. It is the world of ideas. That world is not visible for our normal senses.

His ideas were used later by the philosopher and scientist René Descartes (1596 – 1650). He developed his whole philosophy out of the 'methodological' doubts: Could not be everything in the world (and one's consciousness including) just be a dream? First, he replied, 'Yes!' - Maybe we can only dream of. But even if we only dream anything is left over, that we can no longer deny, namely that we dream. If we can think that we dream, we think - regardless of whether the dream is 'real' or 'unreal'.

Even for western sociologists nowadays Ibn Khaldoun, born in Tunis 1332, died in Cairo 1406, is known as the father of sociology. He spend some time of his life on the Iberian peninsula for a peace treaty with Pedro the Cruel, the King of Castile (1334 - 1369), on a diplomatic mission. Just worth to mention, because we are in Lisbon and known history in the western world usually neglects economical and scientific exchange between the Muslim and Christian world. This historian, politician and philosopher had an interpretation on dreams too:

“Often, we may deduce [the existence of] that high spiritual world and the essences it contains, from visions and things we had not been aware of while awake but which we find in our sleep and which are brought to

22 Paz, Octavio (1965): *El Desconocido De Si Mismo*. in *Cuadrivio*. Mexico. Joaquin Mortiz. p.135

23 Jung, Carl Gustav (1981): *The Archetypes and The Collective Unconscious (Collected Works of C.G. Jung Vol.9 Part I)*. Princeton University Press

24 Corsini, Raymond J. / Ozaki, Bonnie Davis (1984): *Encyclopedia of Psychology*. J. Wiley. 1st edition. New York. p. 249

our attention in it and which, if they are true [dream], conform with actuality. We thus know that they are true and come from the world of truth. "Confused dreams," on the other hand, are pictures of the imagination that are stored inside by perception and to which the ability to think is applied, after [man] has retired from sense perception."^[25]

This interpretation is close to what Muslim scholars did always say: That there are three kind of dreams. False dreams, patho-genetic dreams, and true dreams. This knowledge was used later by Siegmund Freud (1856 - 1939) and Jung.

From my experience with art, because art is always a dialogue, a dialogue between cultures, a dialogue between people, a dialogue between material, a dialogue between universes, a dialogue between knowledge, I have to say that this is common everywhere I go. To understand this, we have to understand the collective thing about it; same like being translated to other languages and still being understood.

The Swiss Carl Gustav Jung (1875–1961), psychiatrist and psychotherapist made his research and did travel a lot to so called primitive societies to search about their dreams.

"The dream pointed out that there were further reaches to the state of consciousness ... the long uninhabited ground floor in medieval style then the roman cellar; and finally the prehistoric cave. [...] [M]y dream pointed to the foundation of cultural history – a history of successive layers of consciousness and constituted a kind of structural diagram of the human psyche; it postulated something of an altogether impersonal underlying that psyche."^[26]

When comparing dreams from black people in the U.S.A. with dreams from white people he did see similar patterns. Trying to make these patterns visible they came close to pictures we have in our mind thinking about old Greek underworld (*Haidēs - Αἰδης*) showing stories from mythology or later made visible in surrealist paintings.

These common figures are still in use nowadays, and specially the ones from nightmares show up in our mind; are made visible in art and by performing artists.

Pessoa is writing as Alvaro de Campos:

"They're happy because they are not me. [...] What tremendous happiness not to be me!" ^[27] De Campos is the other of the three main heteronyms Pessoa did use; living is the same era and having relations to the other heteronyms. He is part of the polyphonous and multi-faceted whole - Pessoa's work - later – after Pessoa's death - discovered from all the documents that were kept in a large wooden box. It is a never ending story; that wooden trunk did contain an estimated 27000 manuscripts and I will just quote two further parts of his poems to describe that gloomy feeling most of his heteronyms show. It is the opening of the long poem Tobacco Shop – Tabacaria [see figure 70 on page 73]:

25 Ibn Chaldun (1969): *The Muquaddimah*. An Introduction to History. Princeton University Press. p. 338

26 Jung, Carl. Gustav (1973): *Memories Dreams Reflections*. Pantheon Books. Random House Inc. p. 161

27 Pessoa, Fernando (2006): *A Little Larger Than the Entire Universe*. New York. Penguin Classics. p. 251

“Não sou nada, nunca serei nada”; 'sou reles, sou vil com toda a gente.’’^[28] - “I am nothing, I will never be anything; I am despicable, vile like everyone else.’’^[29] or a similar one “I am nothing. I'll never be anything. I couldn't want to be something. Apart from that, I have in me all the dreams in the world.’’^[30]

The last showing relations to dream theory of C.G. Jung. Together with my last quote from Fernando Pessoa's poem 'Oxfordshire', which will lead us to the next chapter where I will think out loud about the universe.

*“I'm universally uncomfortable, metaphysically uncomfortable
But the hell of it is I've got a headache.
That's more serious than the meaning of the Universe.’’^[31]*

This 'in between' can cause a headache; it is the constant war going on in a creative brain. Starting with 'We all have two lives' it seems to be a whole universe between these two, between dream and reality. Other critics of Pessoa like Karen McCarthy Woolf (*“Some 27.543 documents and 70+ heteronyms [...]”*)^[32] or the Swiss jungian analyst Cedrus Monte come to the conclusion that there are more than 70 heteronyms Pessoa did use.^[33] His heteronyms are mostly anti-heros who do not seek celebrity. For me they are similar to genius scientists hiding in their laboratories working on the proof of ideas almost non-understandable for the average well educated person during their era. Arriving appropriately well dressed in Stockholm for a day to shake hands, getting honored for a question they once answered and then continued to work in their laboratory on the various new questions the former answer arose. Their laboratory is the place of creativity; just as the workshop for an artist, where new questions are answered and when an object is in its final stage it is like one of Pessoa's heteronyms dies, but he as an author is able for reincarnation to express himself from another dimension; like the artist who continues with the next piece of art and last one will just not be forgotten because it is part of his work catalog and might be seen later in an exhibition; nothing different to Pessoa's wooden trunk. [see figure 72 on page 74]

28 de Campos, Álvaro (1933): TaBaCaRia. in *Presença* [Magazine], *fôlha de arte e crítica*. Coimbra. julho, 1933

29 Pessoa, Fernando (2002): *The Book of Disquiet*. edited and translated by Richard Zenith. Penguin Classics, London.[the affirmation of Álvaro de Campos appears several times]

30 id. [appears several times]

31 Pessoa, Fernando (2009): *The Collected Poems of Álvaro de Campos 1928-1935*. Translated by Chris Daniels. Exeter Shearsman Books. p. 103

32 McCarthy Woolf, Karen: mpt *Modern Poetry in Translation* [Magazine]. Issue: Series 3 No.14. A review on Chris Daniels's Pessoa. URL: <http://www.mptmagazine.com/review/the-collected-poems-of-lvaro-de-campos-vol2-19281935-31/> access on 17.10.2016

33 Huskinson, Lycy / Stein, Murray (2015): *Analytical Psychology in a Changing World: The Search for Self, Identity and Community*. Routledge. East Sussex and New York. p. 194

SYNTHESIS

The mentioned poems, verses of poems and the poets did affect me. I have been searching for their translations, have been seeing them in my time, in my life, in their time, in their life, in my culture, in this globalized world and it made me feel to visualize this melange of their feelings and my feelings turning and turning in my head which sometimes even caused a headache; but it continues turning and will spread if understood or not, because I feel that there is understanding 'in between' all this. Please see figure 71 on page 74, which is one of the series of visualizations of this idea, similar like the mirror in a blown glass bowl which is a small part of the object 'Reflecting Words' [see figure 60 on page 64]. As mentioned before each dimension is incomplete by itself. Sometimes ideas discussed in one chapter became visible very clearly in one glass object, but forming the whole does mean bringing the three dimensions together, which is the source of most of the pieces shown at the exhibition and bringing three dimensions together is told by the story of the exhibition. This synthesis has to be seen together with synthesis on page 19 and the chapter artistic development on page 30.

2.1.2. Scientific Dimension

For any visual artist light is one media to accentuate art. We use it, but we never think about what light really is. We use it as a spot, we try to enlighten a whole object or we play with different colors of light. For me as a glass artist light emphasized even more because it does more than just touching the surface: the material absorbs or reflects. Light goes partly into the material I am using it is 'in between'. It is even the material art can be made of. We do usually just look at what it does. I will try to explain how scientists see the light, because light itself is 'in between'.

To understand this, I did my research looking for scientists who did work with light and during this research I came to the conclusion that they are living in a similar state of mind as artists and poets, they are living 'in between'.

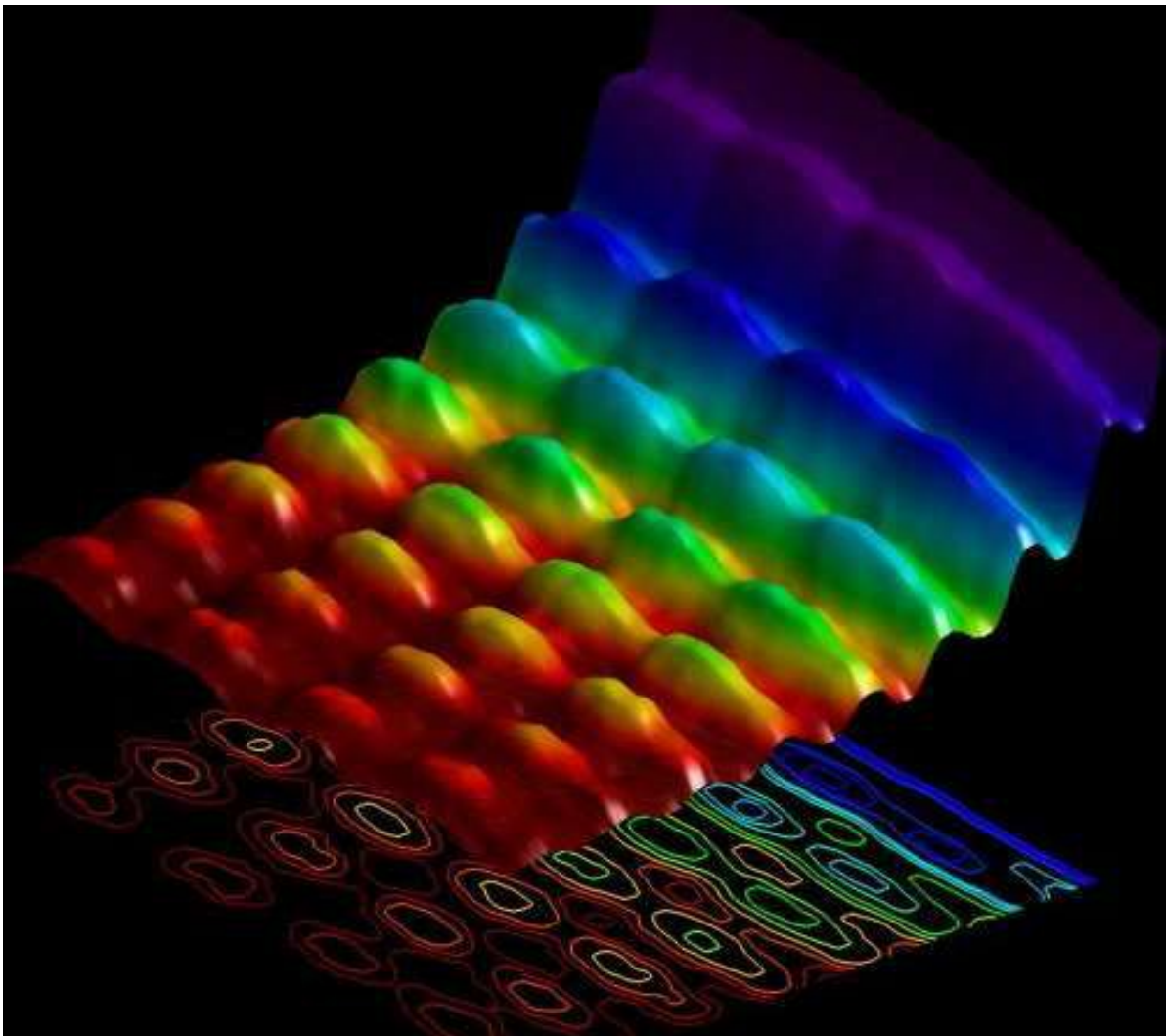


figure 2: First ever Photograph of Light as both Particle and Wave

WAVES AND PARTICLES

In this case too I had a visual inspiration [figure 2 on page 15], because not long ago the first time ever photo was made of light; showing its wave-particle duality. That light is “something” 'in between' could have already been the conclusion resulting from the debate between Isaac Newton (1643-1727) and his opponent the Dutch scientist Christiaan Huygens (1629-1695). Huygens published his theory of light in 1690, which is known nowadays as the *Huygens principle*. According to him light consists of waves. He could show this with crystals from Iceland.^[34] His rival Newton propagated that light consists of small particles (*corpuscles*).^[35] This debate was fought until 1715 and ended in front of the highest authority: the *Royal Society*, which ruled that Newton was right (in a time when 'in between' seemed to be scary for authorities). Hopefully the last skeptic will calm down after seeing figure 2; at least until further knowledge will appear. This wave-particle duality, which seems as something not easy to imagine for non-scientists, was made visible about 100 years after giving the proof that both Huygens and Newton were right. That proof was possible because of mathematical theories. Albert Einstein's theories. Einstein revised the nature of light.

Einstein was born March 14, 1879 in Ulm which is in Württemberg in Germany; he died in April 18, 1955 in Princeton, USA. With five years his father gave him a pocket compass. Later he said that the moving needle drawn by something in empty space made a “[...] *deep and lasting impression*”^[36] He got his elementary school education in Munich in Germany. Later known as one of the most important physicists of the 20th century “*He attended the new and progressive Luitpold Gymnasium in Munich. [...] clashed with authorities and resented the school regimen. He wrote that the spirit of learning and creative thought were lost in strict rote learning.*”^[37] For me his experience does not seem any strange - already showing in early age what it means to live 'in between'.

“Rather than completing high school, Albert decided to apply directly to the ETH Zurich, the Swiss Federal Institute of Technology in Zurich, Switzerland. Without a school certificate, he was required to take an entrance examination, which he did not pass, although he got exceptional marks in mathematics and physics.”^[38]

Following the advice from the head of ETH he graduated at a Swiss high school, then came back to study at ETH, where he got a degree in physics in 1900.

Born as a German in the German Reich he did give up the German nationality with 17 years and preferred to be stateless. In 1901 he became a Swiss citizen and after his emigration to the US he also took US citizenship. It seems 'in between' has a lot of facets.

34 Huygens, Christiaan (1690): *Traité de la Lumière*. Chez Pierre Vander Aa, Marchand Libraire

35 Newton, Isaac (MDCCXXX): *Opticks or, a treatise of the reflections, refractions, inflections and colours of light*. 4th edition. Printed for William Innys. London

36 Schilpp, Paul Arthur (1998): *Albert Einstein, Philosopher-Scientist*. The Library of Living Philosophers Volume VII. Open Court 3rd edition. La Salle, Northwestern University and Southern Illinois University. p. 9

37 Einstein, Albert (2008): *The Man Behind the Theories (Biography)*. Biographiq. Minneapolis. Filiquarian Pub Llc. p. 6

38 id. p. 7

SPACE AND TIME / TIME AND MASS

I remember when I was in high school student the theory of relativity was mysterious for me. Follow students who did understand it felt like reaching another orbit of knowledge. I will try to make its theory understand here with my words so you can follow my research which is even possible for someone who never heard of Einstein's genius before: We have to divide between general relativity and special relativity. Special relativity describes the behavior of space and time from the perspective of observers moving relative to each other.

There could even be a psychological dimension in this thesis: As with Einstein's life between countries, between non understanding teachers, between political currents of its time and between religions, between scientific disputes between scientists and authorities and even between scientist themselves, I do just assume that he was living 'in between' just as an artist does, but this chapter *scientific dimension* is mainly about the perspectives of 'in between' in science concerning to light. The first perspective was already discussed. Light as being 'in between' wave and particle theory, which also means between waves and particles physically and that is why we speak about the duality of light.

When we are thinking about Albert Einstein we need to see him as a theoretical physicist; theory of relativity was his idea. He did bring the consequences of this basic idea to paper and assisted it with mathematical calculations. It was seen later that his ideas matched reality and the ideas were confirmed. As a summary or final consolidation of papers the article 'The Foundation of the General Theory of Relativity' published in 1916 can be seen [see the first page [figure 76] of his original publication in German on page 78][³⁹]. On one side I can see that light itself is 'in between' and this was to understand by scientists in a theoretical way by understanding Einstein's mathematical theory; I can just guess that in the beginning of last century a theory for which it did not exist yet a scientific proof must have been considered weird by most normal people and even weird by scientists who like to doubt as long as there is no proof. Einstein must have felt in between and that cannot be much different to his ancient colleagues Newton and Gallileo. In this case a feeling that might have already been existing because of his religion, his nationality, because of being drawn back despite his knowledge before in his early years.

Because of my own relatively poor understanding of these theories I think that scientists are constantly living in this 'in between'; in daily life they are different than when discussing with their understanding colleagues – if they have. One could say that they have two lives; the one they live with others and the one inside this substratum of mist where they can see some light in the end of the tunnel and this is their motivation to find out more and give answers to former questions. They can just look backwards and answer for this moment. But where is this society, when even nowadays Newton's ideas seem strange: “*Newton made an important distinction between two concepts that are often used interchangeable in everyday language: mass and weight.*”^[40] Or one might think about Galileo Galilei's last words: “[...] *eppu, si muove* [italian] (*but it still moves*).”^[41] Are we really so much further with our understanding nowadays?

39 Kox, A.J. / Klein, Martin J. / Schulmann, Robert (1997): *The Collected Papers of Albert Einstein*. Volume 6. The Berlin Years: Writings, 1914-1917. reprint Princeton University Press, p.147

40 Schutz, Bernard (2003): *Gravity from the Ground up: An Introductory Guide to Gravity and General Relativity*. Golm Germany and Cardiff University UK. Max Planck Institute for Gravitational Physics. p. 10

It took until May 29th 1919 to give a proof to Einstein's theory. But even before Einstein's theory scientists did try to understand that phenomenon resulting from Newton's law:

“The Reverend John Mitchell, a British astronomer, realized one especially interesting consequence of Newton's laws of gravity and motion. If an object massive enough or small enough, its escape velocity can be greater than the speed of light. In 1783, he pointed out that an object 500 times the radius of the sun but of the same density would have an escape velocity greater than the speed of light. [...] Einstein published a mathematical theory of space and time in 1916 that became known as the general theory of relativity. Einstein treated space and time as a single entity called space-time, and his equations showed that gravity could be described as a curvature of spacetime.”
[⁴²]

May 29th 1919 was the day of proof to Einsteins theory: Sir Arthur Stanley Eddington's expeditions - one to the Portuguese island of Príncipe and the other team in Sobral in Brazil to observe the solar eclipse - gave the proof by measuring stars close to the sun [see figure 77 on page 78]. The conclusion of their measurements was the interrelationship between *mass and space* and *space and movement*. Since then we non-scientists understand Einstein better: In space we find flat space and curved space. The mass is interfering in space. The conclusion was the interrelationship between mass, space and movement: mass interferes in space, where we find flat space which is far from big mass and curved space closer to big mass. The curved space controls the movements. That means the time. [see figure 78 on page 78] The world press reacted. The New York Times gave a headline on November 10 1919 because of the proof of Einstein's theory of general relativity [see figure 79 on page 79]; and it seemed that one should not be as scared about the new knowledge as centuries before.

Before Einstein the universe was seen just to be matter and empty space.

“The idea that light waves carried energy in discrete amounts, which depended on the wavelength, meant that scientists had to start thinking about light as if it were a particle. This took some getting used to. But the experimental evidence in favor of Einstein's proposal is overwhelming, this so-called wave-particle duality of light is something that modern physics has to embrace, even if it is a little hard to visualize in concrete terms.”[⁴³]

My job as an artist was to be influenced by all this scientific knowledge and visualize the relations between to fill the empty space.

41 Hilliam, Rachel (2005): *Galileo Galilei: Father of Modern Science*. Rosen Publishing Group Inc. New York. p. 94

42 Seeds, Michael A. / Beckman, Dana (2016): *Foundations of Astronomy*. Cengage Learning Boston. 13th edition. p. 309

43 Schutz, Bernard (2003): *Gravity from the Ground up: An Introductory Guide to Gravity and General Relativity*. Golm Germany and Cardiff University UK. Max Planck Institute for Gravitational Physics. p. 86

SYNTHESIS

We are all living 'in between' flat space and curved space. Laws of physics are ruling our life from first to last second. My scientific approach to 'in between' could be divided in three perspectives. Knowledge fairly young comparing the time mankind is using art.

Glass in grain form was the material I did use for my objects besides ceramics and wood. My aim was to visualize how the different perspectives are interfering each other. A single grain of glass cannot be art, but interacting with others in a defined space (exhibition space) it could transport my ideas which visualized the scientific dimension of 'in between'.

Single grains of glass function perfectly as a symbol that light consists of particles. The first perspective of 'in between' of light was the debate between two known scientists: Newton and Huygens. A debate in a time when just one truth could be accepted. After my first flat *pâte de verre* experiments I could reach the stage of *manipulated pâte de verre* which did give me the chance to show the duality of light. Creating controlled glass waves with still visible grains was the synthesis of Newton's and Huygens' ideas about light. [see figure 56 on page 60] Both published their knowledge in books. We are living in a culture giving more importance to written information - information one can quote, tell the year, publisher and place the book in a library to be used centuries later - , than to verbal information, which might get lost easy. 'Passage de Vie' is the place to find knowledge. It contains many sides and each might give a different view. A book itself might just be one of a few and each of them can be a passage in life. Even its knowledge can get lost when its pages start to rot. We have to handle it with care which does also mean that we have to think besides reading.

Einstein's theory of special relativity was published as 'On the Electrodynamics of Moving Bodies' in June 30 1905. [44] It is about time and space and movement. To make this visible in one object had the benefit to create one which could also show the different stages of glass to the visitor at one time. Working with glass means bringing it from one existence to another. Usually one sees just one form. 'In Between Different Moments' [see figure 64 on page 68] was the challenge to bring these different stages appearing at different times at the same place (in same space) into an object still showing the movement. The effect seems reversible or looking like a video running in a loop. Grains are visible, and the whole time from fluid are visible. Depending on the observer's position, or depending which side of the object is placed up or which side is placed down Einstein's theory of special relativity is visible.

During this thesis' research I reached that level I was talking about before when admiring students who did understand Einstein when I was 15 years old. Einstein's theory of general relativity became clear now. This was the third perspective showing the 'in between' of light. We can find flat space where we do not find big mass. In surroundings with big masses a lot of interfering appears. But there are the places with much less or even without interfering or disturbing, which again is in a way that can be mathematically calculated. My exhibition did show two works of art consisting of flat *pâte de verre* objects. [see figure 63 on page 67] Inside the wooden frame one finds them both flat in a defined parallel distance to each other. Flat spaces to not interfere each other. What is going on might look similar. But each has its own life; we cannot find the

44 URL: <http://www.fourmilab.ch/etexts/einstein/specrel/specrel.pdf> access on 14.11.2016

same a second time. The visitor can see clearly symbolic ornaments of my culture. It is like the basics of *pâte de verre*, from where all spread and did explore the places of the universe, where a lot of interference happened in big, not knowing yet why the universe has this form [see figure 58 on page 62], or in small, giving a form [see figure 57 on page 61] looking as if the scientist knows exactly how it is moving in space.

For one of my objects I gave myself more freedom: it is a junction of materials and methods. Finally, it became the one attracting the visitors mostly; that was not planned. [see figure 59 on page 63 and figure 83 and 84 on page 81] 'Work in Progress (Video)' is bringing in 'all' at the same time, it is the opposite to 'in between'. It is the opposite to the story told from object to object: the correlated materials glass and ceramic in very simple forms of harmony. Concentric half bowls placed in the middle of the exhibition. The form is like open offering hands; it is placed on a stand just slightly bigger than the object itself. The visitor could come as close as possible to see the heartbeat of the process of creativity from first ideas related to Fernando Pessoa sketched on paper to filling frit into mould to manipulating *pâte de verre* inside the kiln or pouring molten glass, ... Showing the whole process over and over again in a loop and a never ending flame of creativity. This object gave simple answers and did not try to lead someone to another level of understanding, but for me it is the object symbolizing energy, knowledge and creativity: the flame appearing in the video, which is light, which is energy. The very first moment of the universe energy was existent at one (small) place, when there was no matter, no time, and the energy spread just like the concentric half bowls. It is going everywhere – so it is the opposite to 'in between'. Michio Kaku (born 1947), professor of theoretical physics at the City College of New York and CUNY Graduate Center, was introduced by the glass artist Robert Wiley (born 1970) in the first semester because of his ideas about creativity. That American theoretical physicist and futurist did say about the first moment of the universe: “*The secret of creation, the secret of everything is locked in that first second.*”^[45] I wanted to place that moment/second into the middle; it is the starting point.

45 Michio Kaku in National Geographic – Naked Science - *The Most Important Second ever. BigBang* URL: <http://www.dailymotion.com/video/x2nm6bw> access on 23.12.2016

2.1.3. Artistic Dimension

INSPIRATION

My first approach to find out more about 'in between' in an artistic way was by looking at the cover of the first issue [see figure 73 on page 75] of the 'Orpheu' magazine, showing symbolized lights and a woman in between these. It was designed by the architect José Pacheco. [46]

Understanding 'in between' is possible in many ways. One of my attempts was to understand Pessoa's time in an artistic context. Going back to the time when Pessoa lived in Lisboa is the time when members of the Orpheus' group or Orpheus's generation (*Geração de Orpheu*) met in the café '*A Brasileira*', where Fernando Pessoa did first attract me [see figure 1 on page 4]. Among these members were the Portuguese artists: Mário de Sá-Carneiro (1890-1916), Amadeo de Souza-Cardoso (1887-1918), Guilherme Augusto Cau da Costa de Santa-Rita (1889-1918) and José de Almada Negreiros (1893-1970) [47]. The last one became a symbol of the Orpheus's group during the 20th century; not only because of his importance but also because he was the last survivor of them. The others had a short life.

Fernando Pessoa wrote one text about art. It was for the exhibition of the Portuguese artist José Negreiros who had his first exhibition of drawings in 1913.[see figure 74 on page 76][48] Pessoa was talking about "polimorfismo". [original: see figure 75 on page 77]

*"E o seu [the artist Almada Negreiros] polimorfismo — a que atribuil-o [!], cingindo-nos criticamente só a ele? Será poliaptidão do artista, incerteza em encontrar-se, ou uma assemelhavel imitação ou adaptação a varios generos? Creio na Synthese, sempre, e aqui ela vem em meu auxilio. Porque me parece que de todos estes tres elementos se forma o multiformismo do artista. Ha qualquer coisa de **procurar** [italic and bold]; ha, infelizmente, tambem qualquer coisa de **achar** [italic and bold](nos outros); — mas ha tambem, para quem sabe vêr, nitidamente personalidade e originalidade atravez d'essas influençãões e tentativas."*[49]

46 Brooker, Peter / Bru, Sascha / Thacker, Andrew / Weikop, Christian (2013): *The Oxford Critical and Cultural History of Modernist Magazines Volume III: Europe 1880 – 1940*. Oxford University Press. p. 414

47 Serra, Joao B. / Guimaraes / Fernando & Martins / Fernando Cabral & Henriques / Paulo & Rieiro / Ana Isabel (1997): *Modern Art in Portugal 1910 - 1940 the Artist Contemporaries of Fernando Pessoa*. Stemmler Edition. Zurich

48 Pessoa, Fernando (1913): "As Caricaturas de Almada Negreiros." *A Águia* nº 16 série II. Porto. April 1913

49 id. p. 135

Translation: [50]

*And [the artist] polymorphism – to what shall we attribute it, provided we focus solely on this aspect? Is it due to the artist's poly- or multiple aptitudes, an indefinable voice, or the ability to imitate and adapt a diversity of genres? I believe in Synthesis, under all conditions, and it is Synthesis which now comes to my aid. Because it seems to me that all three [aforementioned] aspects comprise the multiform essence of the artist. There exists something to **seek** [italic and bold]; there is also, unfortunately, something to **find** [italic and bold](in others); – but there are also – for those who know how to see with clarity – personality and originality which emerge from these influences and forays.*

For me polymorphism shows a similarity to his heteronyms; it shows a relation to wave and particle duality, it shows a relation to unity and multiplicity. Later in 1915 Fernando Pessoa published together with Mário de Sá-Carneiro and José de Almada Negreiros the *Orpheu* magazine [see figure 73 on page 75]. According to Steffen Dix, a researcher at the Research Centre for Communication and Culture of the Portuguese Catholic University (*Centro de Estudos de Comunicação e Cultura*) “The publication, at the end of March 1915, of the first issue of the literary magazine *Orpheu* is considered as the cradle of the First Portuguese Modernism.”[51] Like with my art projects it tried to go beyond national perspectives and aimed to recognize transnational relations by seeing relations between the intellectual, historical, political and religious milieu. The *Orpheu* magazine called itself a 'quarterly literary journal'. Unfortunately after first issue in March and second issue in June, it was not published anymore because of financial reasons.[52]

Visual artist are the ones who have access to the whole kingdom of images. It is the kingdom visible as forms, lines shapes and structures which can show another reality to the viewer. With their creativity they can develop new forms, have forms transferred to another level. That is what we see. The form is their tool like the language for the poet. The material is their tool like the alphabet for the author. Both are the tools to create a message or better to say to make a message visible. For me it seems to be more than just the duality of material and message. My aim is to show what more is there in 'in between'. I wanted to use new tools. I did use new tools and I call it manipulated *pâte de verre*. Trying to show in this artistic chapter that there is more between these two - just as we already know here that there is more than just two or three heteronyms in a multifaceted personality – the constant research continues and might lead us to new knowledge, progress and of course benefits for a society. As someone with a different religion, someone from a different culture and someone who's artistic work is always about communication between cultures, it comes into my mind that in the Arabic language we have one single word to describe this engine everybody has, his drive to develop new skills, his motivation to do a research and asking questions and find answers having a positive effect for a society. A word well known but not understood in other societies. *Ijtihad* (اجتهاد).

50 I asked Christopher Damien Aurette, Professor Auxiliar, Departamento de Ciências Sociais Aplicadas, FCT (2016) to translate it for me

51 URL: <http://cecc.fch.lisboa.ucp.pt/en/projects/1915-the-year-of-the-orpheu.html> access on 29.10.2016

52 Brooker, Peter / Bru, Sascha / Thacker, Andrew / Weikop, Christian (2013): *The Oxford Critical and Cultural History of Modernist Magazines Volume III: Europe 1880 – 1940*. Oxford University Press. p. 414

INFLUENCE

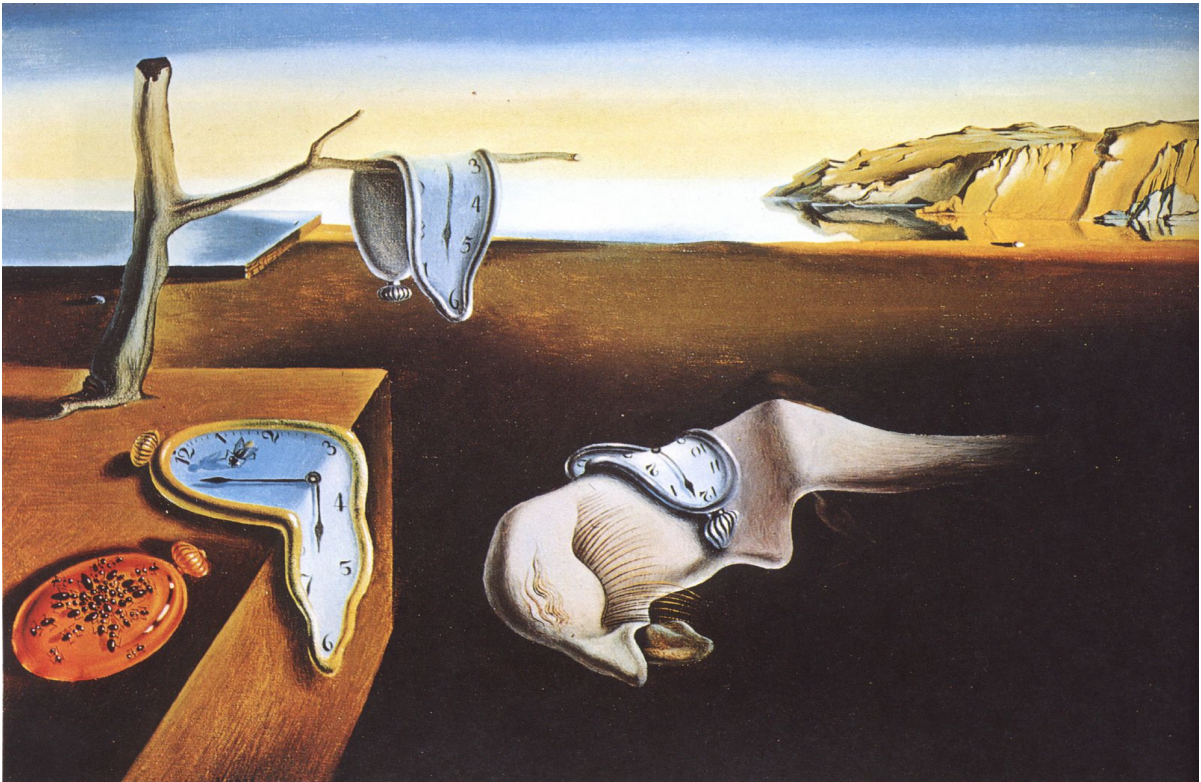


figure 3: *The Persistence of Memory* by Salvador Dalí, (1931) oil on canvas 24 x 33 cm

As in the other chapters (poetic dimension and scientific dimension) I was also influenced by a visual moment. A small surrealist painting [see figure 3] in size 24 cm x 33 cm. Maybe the most known painting by the Spanish painter Salvador Dalí (1904-1989).

“Dali's paintings employed a meticulous academic technique that was accompanied by the hallucinatory unreal “dream” state he depicted in his imagery. He described his pictures as 'hand-painted dream photographs'. Dali employed extensive symbolism in his work. He had favorite and recurring images, such as the human figure with half-open drawers protruding from it, burning giraffes, and watches bent and flowing as if made from melting wax. His famous [']The Persistence of Memory['] suggest Einstein's theory that time is relative and not fixed”^[53]

This “hand-painted dream photograph” often just called melting clocks show with its simple symbolism what I was going to show on a different level. Coming back to my 'in between', in this case the in between science and art or with a closer look at it the in between different stages in existence at the same time: One of my *pâte de verre* sculptures 'In Between Different Moments' [see figure 64 on page 68] shows this in the most simple way. It is a sculptural snapshot of time; making the process of creating of all my objects visible. One can see waves and particles. The viewer can see single grains in *pâte de verre*. Some are clearly visible as single grains still having their freedom, then fused, then melting and being together again. The observer recognizes several stages of existence during time from top to

53 Pross, Victor (2009): *Icons & Idols: Pop Goes the Culture*. AuthorHouse. Bloomington. p. 129

bottom. This piece of art would be turn-able. Nobody placed it upside down during the exhibition. I can just guess: People are scared, because they see its fragility just as in Dalí's painting where the movement is visible and two clocks seem to be stable but one appears close to sliding down. My object is turn-able and the viewer gets a slight view of this image in the semi reflective surface where it is positioned. This is in contrast to 'The Persistence of Memory', where the dream world is still affected by gravity. I think that people are also scared because touching time is considered like a sacrilege. For example we do not know when our time ends and feel that it is in God's hands. In former times not having exact watches the knowledge of time was given just to scientists, ordinary people followed the time that was given to them. Depending on the place where we are it could be by the muezzin from the minaret or the bell from a church tower. And that time was a different one in every city or village depending on its coordinates. Synchronization of time started with the beginning industrialization in England. According to Schivelbusch it was necessary for the timetables needed for a functioning newly invented train system and upcoming technological changes [54]. Big mechanical clocks were followed by battery driven quartz watches. The run for the most precise time does not seem to end [see figure 80 on page 79]: Modern atomic clocks are broadcasting the 'right' time. Now already understanding 'in between' within its different dimensions I did see Dalí's in between as a painter. Coming back to Dalí's miniature painting: it inspired me directly to do my smallest piece of art [see figure 64 on page 68] and generally to think about movements in our mind, which are described as surrealistic by non-artists.

Salvatore Dalí is painting his surrealist dreams into real landscapes; the "[...] *seaside landscape on the cliffs in his home region of Catalonia, Spain.*" [55] functions as the real background. I had to place my dreams in glass into the universe, which I did open with my scientific research. In that not easy understandable world of mass and time and movement I wanted the messages be understandable at least subconsciously for a first time viewer and let her/him feel without reading this thesis.

In terms of material glass, I was mostly influenced by the Estonian glass artist Mare Saare; her results made with *pâte de verre* fascinated me. Years ago I used already *pâte de verre* at the *Kunliga Konst Högskolan* in Stockholm; in 2015 I did get the chance to do experiments with that material at the Estonian Academy of Arts. I was impressed how much freedom Mare Saare is giving to the material. She applies the material freely on the top of sand without using any mould. According to her this special sand is coming from Russia. For me her sand moulds look like miniature Japanese rock gardens (*Kare-san-sui* 枯山水) [see figure 81 on page 80]. She puts her structures into the sand and when her objects are turned 180°, they show these structures.

With my first experiments at the *Eesti Kunstiakadeemia* I tried to reach more controlled results than sand could give me as mould. I wanted to use a traditional plaster mould and be able to have the possibility to engrave by hand into the mould and keep the form stable on the plaster for better results after firing. Because I preferred the grain sticking to each other without spreading away, still visible as a single particle and not the visual solidity of Mare Saare's pieces shown in figure 4. I tried a similar result as I did see partly in the final edges

54 Schivelbusch, Wolfgang (1986): *The Railway Journey: The Industrialization of Time and Space in the Nineteenth Century*. University of California Press. Berkeley and Los Angeles

55 URL: https://www.moma.org/learn/moma_learning/1168-2 access on 28.10.2016

of her flat objects. That should have been not only at the thin edges, but everywhere, even where the glass is thick.

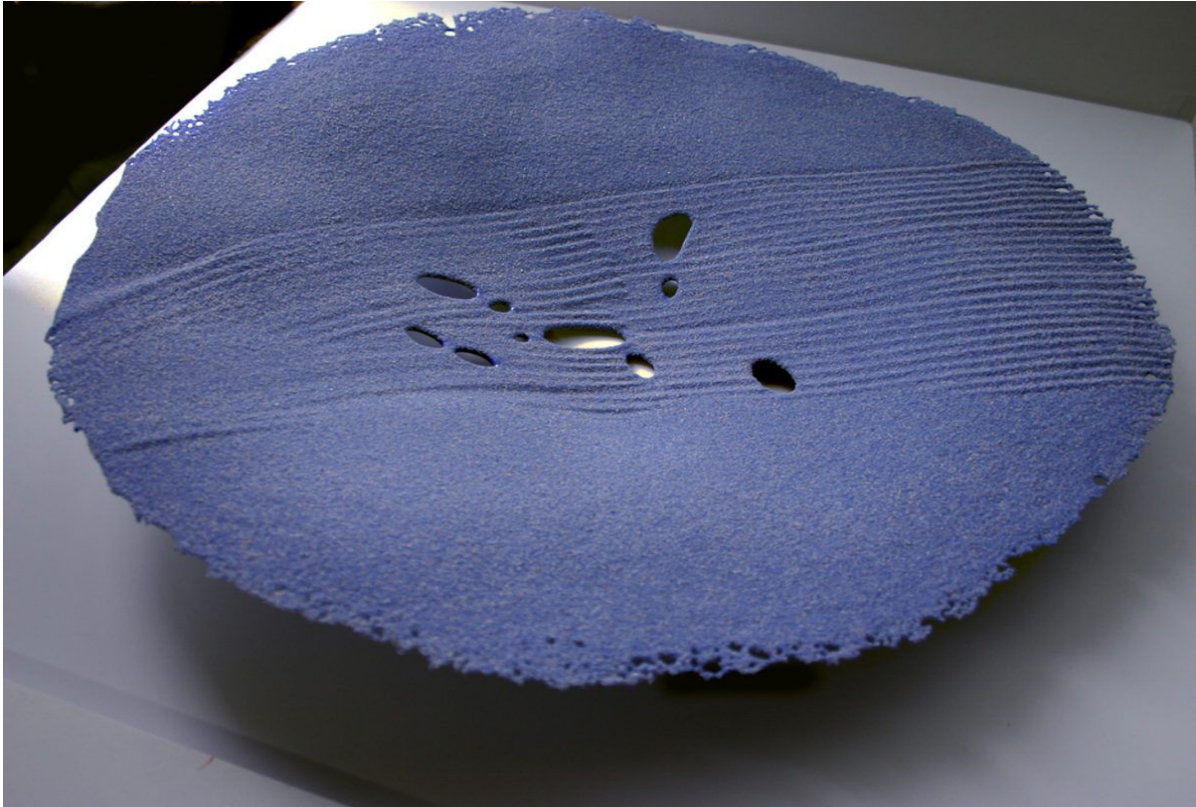


figure 4: Void by Mare Saare (2004) D 40 cm

During this stage of my experiments I could just compose two-dimensional objects that would create the same three-dimensional effect for viewers as a drawing or painting could create in their minds by seeing it in a memorized context and bringing it in relation to the knowledge of seeing in reality. That was similar to painted landscapes having less colorful and clear background; same could be done by smaller and bigger grains of *pâte de verre*, which melt to each other more or less at a set temperature of first firing.

SYNTHESIS

My aim was to reach real three dimensional *pâte de verre* objects, as I am used to create as a sculptor, and what I did before with closed and open moulds, but leaving solid glass behind me. The same a glass blower could do: light and fragile looking objects in three dimensions. I wanted to create art pieces just made with *pâte de verre* technique; not combined with other glass techniques, no adhesives, nothing else than that besides possible stands or displaying boxes. The technical procedure needed to be newly developed and refined to bring my artistic vision with its story from my mind to the public. My artistic vision - already existing because of my background synthesized with what I did pick up from science at vicarte - became more clearly during my research for the poetic and scientific dimensions of this thesis, but took a part of the freedom I was used to (as mentioned before on page 1 in the introduction about working freely as an artist) without narrowing me too much. So for me there was also 'in between' within these clearly defined borders, but it still gave me enough space for my intuition.

2.2. Artwork

2.2.1. Pâte de Verre Process - Between its Possibilities and its Limitations

The *pâte de verre* method was already used by glass-makers in ancient Egypt.^[56] It is a casting technique for making glass objects. The translation from the French *pâte de verre* is glass paste. About one century ago it became popular. Traditionally the *pâte de verre* process starts by mixing a paste made of fine powder or frit mixed with an adhesive as glue or gum arabic which makes the paste stay in position while firing. The glass will be applied into the negative mould and fired in the kiln with a special temperature. After annealing one takes it out of the mould and the object can be finished with a cold-working-process if needed.

With the emerging of blowing glass this technique was abandoned and it was not until the 19th century that the French artists Henry Cros (1840-1907), François Décorchemont (1880–1971) and Gabriel Argy-Rousseau (1885–1953) used *pâte de verre* and did bring it into vogue.^[57] Their objects are still popular nowadays.

My aim was to find a way which exceeds the usual work process with *pâte de verre* taught in glass schools, suggested by glass makers and recommended by glass workers with their *fiches techniques*. This was possible by extensive experiments starting with try and error but in the end of my research I was able to reproduce this techniques that allow my *pâte de verre* its own stage - 'in between' its possibilities and its limitations.

The favorable material used was bullseye glass because of its optical qualities – with a trained eye one can see that it is more clear, more shining and technically it is more predictable because of high quality standards which made it also easier to work with. Because of monetary reasons glass from the furnace was used too^[58]. It was also used to demonstrate that is possible to use different glass compositions in the technique developed.

Being able to bring *pâte de verre* into different formations and shapes after the usual and known work process I call my glass *manipulated pâte de verre*, the subtitle of this thesis.

Personal experience and experimentation is the best way to discover a new 'ultimate formula' - the strength to ask myself questions not asked before and to doubt well-meant advice resulting out of the usual work process' knowledge helped and made me feel like the personalities mentioned in the chapters before in their 'in between'. No draw back could stop my intention to reach my goal. What was first just an idea and what sometimes seemed to be an accidental result arrived to a constant result and knowing the new methods and having experience with it helped to concentrate on the artistic side of creation.

56 Bray, Charles (2001): *Dictionary of Glass Materials and Techniques*. 2nd Edition. A&C Black London. University of Pennsylvania Press Philadelphia. p. 182

57 Cappa, Guisepe (1998): *Le Génie Verrier de l'Europe – Témoignages de l'Historicisme à la Modernité (1840-1998)*. 2^{ème} édition. Pierre Mardaga. Belgique

58 glass of the furnace allows a cheaper solution to work

2.2.2. Technical Procedure

Experiments and developments from making glass frit to casting form into glass objects which speaks about life and its struggles, our fragility and our strength:

Extensive details of my experiments will be explained in the chapter fichas techniques providing the recipes for *manipulated pâte de verre*. [see page 39]

2.2.2.1. PREPARATIONS

1st STEP – PREPARING THE FRIT

As mentioned before most objects were made directly with bullseye frit. When using furnace glass - soda-lime-silica glass - it needed to be prepared. The glass is crushed to different sizes of glass grain and then sifted to remove the smallest particles. Larger chunks can be ground by hand using the mortar and pestle type method. A permanent problem is that impurities from the container or crusher can contaminate the frit, that problem will be discussed below.

Another method of obtaining frit is to grind the cullet using a gravel crusher or similar machine. [see figure 82 on page 80]

2nd STEP – CLEANING AND DRYING THE FRIT

After grinding the glass and sifting to different size we have to wash it from iron. This was done by cleaning the frit with acid measuring three parts of chloridric acid (*ácido muriático – solução < 25%* - usually used for sanitary cleaning) and one part of nitric acid. After 24 hours we have to clean it with water many times to take away the acid and we can dry the glass. Before pouring out the the water acid mixture it will be neutralized by adding calcium rocks. In the beginning there are a lot of bubbles. When no more bubbles appear this step is done, the water can be poured out.

The glass, once cleaned and dried, is then sifted to get different visible results, different reflections, different meanings, different structures to emphasize the message of the art.

By using various sizes of metal screening fit into wooden frames I could reach different size of frit. [⁵⁹] Each size of the frit is kept separately and used for different purposes.

3rd STEP – MAKING THE MOULD BY USING DIFFERENT TECHNIQUES

I did use three kinds of mould, which were made out of plaster and silica. Sometimes I add chicken wire or fiber glass to give more stability and to be able to work on them

⁵⁹ Because of small particles it is advised to use a respirator.

several times. First they were two-dimensional and engraved with words or ornaments. After the first firing I did use a second kind of mould to bring my art to the third dimension. The third kind of mould was made out of kiln paper, which is soft after firing and has the benefit to take out the piece without braking, when it is too fragile.

4th STEP – PACKING THE SEPARATED FRIT INTO THE MOULD

Most of the sculptural work is made with a frit consisting of glass particles that are 30 mesh in size which is about the same appearance as sugar. I did add various particles of 15 mesh (larger) and 100 mesh (smaller) [see table 15 on page 82 and 83].

Packing the frit into the mould is a time consuming job, because I wanted to reach a visible fragile result in the end, this means the grains have to be in thin layers, and sometimes I wanted single grains just touching each other partly to make the fragility visible but bring enough solidity into the whole final structure.

2.2.2.2. FIRING EXPERIMENTS

The first small experiments were done by using firing schedules given by the factory (bullseye), by tables I found in Graham Stone's kiln companion [60] and compared with schedules used by the Portuguese glass artist and professor Teresa Almeida [61]. The results asked for extensive adjustments of the firing schedules.

KILN PAPER EXPERIMENTS

When using a kiln there is a set temperature. In next stage of my experiments I wanted slightly different temperatures during the firing to reach that point when the single grains of different size and the parts laid thicker on the carved mould still gave me the result I wanted: a result visible as starting to melt together and still visible as single grains. That meant to find the right temperature and time for this one firing. This stage of my experiments is called kiln paper experiments. By carefully placing kiln paper over thinner parts or parts with smaller grains I could control the melting process during the long time needed for the thicker parts even for the thinner parts. To reach a solid structure according to the thickest part of my objects I started using calculating tables provided by the factories, they needed to be adjusted. Final results of these experiments were flat as one can see for example in figure 63 on page 67 ('Same Time / Different Life') or in the object 'Reliving Papers' (see figure 65 on page 69).

60 Stone, Graham (2010): *Firing Schedules for Glass: The Kiln Companion*. Igneous Glassworks

61 Almeida, Teresa (2011): *O vidro como material plástico: transparência luz, cor e expressão*. Ph.D. thesis, Aveiro University

SLUMPING EXPERIMENTS

Next step was to bring these objects into the third dimension just as Dalí's clock is melting or one could imagine the wave of light [see figure 2 on page 15]. I was thinking how to give the impression to overcome gravity or at least a trick to have the final glass object looking like being made in a surrounding without gravity. Applying grains of different size, color, transparent or opaque into graved mould had already been a challenge and was partly done directly in the kiln. This step now required a second firing in which I placed the glass from first firing on top of three-dimensional moulds. After a long range of experiments, I did reach that stage when the objects – still looking fragile but actually solid - could be moved out of their carved mould without braking and placed on the second three dimensional mould for the second firing. In that case the annealing time needed to be extended to give more sustainability to the piece and keep the grains touching each other and not breaking apart. A close look at parts of 'Passage de Vie' [see figure 56 on page 60] shows this step of slumping, the second firing giving a movement to the former flat pages, which later were attached to each other in a third firing trying to overcome the obstacle of further movements.

ROLLING'S STEPS

This slumping of flat *pâte de verre*, being already the final stage for objects like 'Reflecting Words' [see figure 60 on page 64], was the intermediate technique in this procedure. Another method was needed to reach results like the one to be seen on the invitation card [see figure 47 on page 55], the exhibition flyer or on the first side of the exhibition catalog. At 730°C I opened the kiln and did bring the glass to the form I wanted. That had to be done as fast as possible not to drop the temperature.

THREE-DIMENSIONAL OBJECTS

The objects made with this *manipulated pâte de verre* process already reached a level fairly easy to make; I wanted to go further showing what could be possible with this method without rolling or slumping technique. [see figure 57 on page 61]

2.2.2.3. OTHER TECHNIQUES

SAND CASTING

Liquid glass is poured directly into a sand mould. That is not very far from casting liquid metal like bronze into the mould. My aim was not to do sand casting as it is known. I wanted my flat *pâte de verre* object to be part of it. I had to heat it and place it on the sand mould right the moment when pouring the liquid glass. Please see fiche technique no. 6.5. sand casting on page 49.

CERAMIC

Adding a ceramic plate to glass was to create a contrast and ambient atmosphere. It is a good combination for *manipulated pâte de verre* piece. Ceramic is correlating the glass. [see figure 59 on page 63]

MIRROR

This mirror process was attracting technique giving me the chance to understand the scientific formation of silver mirror more and it could be used to emphasize the message of my art. [see figure 60 on page 64]

2.2.3. Synthesis

Some experiments did lead me to add some material to compliment the finishing piece as ceramic, mirror or wood. These additions and combinations process could give the work more attraction aesthetically. The need for several firings, because I wanted to see the grain structure after fusing - still granular, not solid -required different anneal soak - , initial cooling - , second cooling – and final cooling time for each piece of art. But this duality of being fragile and solid, this dualism of static and solid, is to accentuate the 'in between' on different levels. The visibility of single glass grains is one of it. Turning fragility into force took *pâte de verre* to a new level, to *manipulated pâte de verre*.

2.3. Artistic Development

To understand life one has to learn which means has to read. I could say that I did start to read as soon as possible and one of the first words I read was the call to read: in Arabic it is *iqra* (اقرأ) [62]. 'Passage de Vie' [see figure 56 on page 60] could be seen at the beginning of the exhibition. Scientifically it shows waves and particles; the book is light. Light is knowledge. This exhibition is just one small passage of life. For the visitor the book is the entrance. It was planned to be a redoubtable piece of art, presented on the biggest stand but reachable, meaning not high. The visitor is doing her/his next step by her/his own will. Understanding piece by piece.

Other objects of my exhibition can be seen very close to the scientific dimension. Just like Einstein already having the idea but not the proof yet 'Sensibilité & Fragilité' [see figure 57 on page 61] shows what seemed to be impossible to create from *pâte de verre* before, but the idea existed in my mind and it was just a question of time when to present the proof that a complex form like that is possible. The idea about this form came in a glimpse of a second, when my mind visualized Einstein's relativity intuitively. One second later understanding Einstein had to start from the beginning and it took a lot of effort, but this form rested.

62 imperative/grammatical mood of the Arabic verb 'to read' that forms commands or requests

On one side 'Same Time / Different Life' [see figure 63 on page 67] brings the visitor into my world of different grains reacting to each other at the same time; the same times were used for the kiln (and even the same temperatures - 730°C) but the results look very different, because they had their own life, which is showing the scientific dimension of it. On the other side, one can see that we always have the same time in our life. It is measured in seconds, minutes, hours, days, weeks, months, ... It is repeating as there would not be any change but it is not the same, it is from young to old, it is going from fresh to rotten, but repeating again in a circle like the glass from liquid to grain and from grain to liquid. I was combining this with symbols of my culture, because I am living in the same time and I have different lives. The advantage when compared to Pessoa is that I can live them under my own name.

Living a life as an artist means constantly being influenced by the themes working on – even when not working on it. Fernando Pessoa did touch me and I wanted to visualize how I did see his 'in between' in his poems, which is mainly seen as the dark side of life by his critics, and how I did see this great Portuguese, visible on black and white photos looking just dressed black and white. On 'Ce Qui Reste' [see figure 62 on page 66] one does see black and white too. It was my attempt to give him more light. The light appears when opening the black box. The black box is the place where to find stored what was written before, what was thought before, what was said before. His papers were discovered in a wooden trunk [see figure 72 on page 74]. But once it was opened it opened a whole universe – light is enlightening the universe. Fernando Pessoa did en-light my time in Portugal. By first sight this object is making it easy for someone visiting an exhibition who is not an art critic, it is a wooden box. It is a typewriter. Everybody recognizes. One page is a part of one of his poems and easy to read. Already rotten at its edges but clearly readable. And one has to understand it together with the sound of the exhibition. A typewriter making sound for one line, for one word or sometimes for a paragraph and then it is quiet again; time for creative thinking. As in any exhibition the visitors' walk from one object to next is carefully planned by the artist or curator. It means teaching, it means guiding and sometimes it means even manipulating them. On their walk they did hear the type writer sound, which did already create an ambiance, that finds its climax at the typewriter on the desk. 'Ce Qui Reste' is the last piece to look at. During the exhibition it became the meeting point where visitors started to discuss. It did bring together the ones feeling good and understanding what one gets by the first view on this arrangement on the table and the ones following my intention, who saw it as the summary of my exhibition. It was the place where people asked for photos. In terms of technical procedure the typewriter shows what is possible with *manipulated pâte de verre*: the whole range from thick to very thin. This attempt to give them (Pessoa and the visitors) more light will stay. The single visitor finds herself/himself in a private atmosphere with Pessoa and when leaving this object with its complex form, that did create time and space with her/him. His artistic spirit will stay – longer, hopefully longer than the sound effect still lets her/him remind about when leaving.

Working hard for the art, in the end the pieces have to be shown. We have to find a space to show our creation. Sometimes we create art for a special or specific space (places) in public space - out-door or in-door. In my case I choose the embassy location because of its historical background. The building is from the time when Pessoa lived. The building

was constructed by a wealthy Portuguese family and later sold to Algeria. The old architecture and decoration reminded me about Algerian tile decoration of old times made by Turkish artists. The ceramics made the spacious room, where the exhibition took place, more colorful: red floor with small motives of white and blue, squared pieces of ceramic; even the walls were surrounded by ceramic tiles in different colors. In that situation I had to continue my challenge by dealing with the space and see how to show the art pieces without creating a mess or blocking the vision. In the end I found out, that it was a good contrast for my pieces, that big mass of the space could reflect a good ambiance or atmosphere to the art pieces. The pieces were seen more light in terms of not being heavy. They were seen more fragile. I could create an equilibrium between space and art pieces and also between colors and trans-lucid glass.

The exhibition was shown a second time at the faculty of fine arts gallery at the university of Lisboa. A responsible of the university wanted my art to be seen by more students and teachers.

3. Results and Discussion

Showing 'in between' in the scientific world was an easy approach: the scientific dimension of it is logical and leading to final answers, which usually appear because scientists present their ideas together with proof-able data. The small trip back in history of light did also show that 'in between' existed before.

Starting in the poetic world with one poet did open many new doors: behind some I could find philosophers, behind others poets and their critics. Some questions could be answered but more ways to answers were discovered. Sociology and psychology and almost all of mankind's history concerning 'in between' could fit into this thesis if I would not limit myself. Limiting is one side of 'in between'; this research had to be limited within its borders. It is like feeling freedom – feel-able just within its borders. Soft sciences try to be same logical as physics in the scientific part. The way I did the poetic research showed how diverse our world is.

The artistic dimension could show the widest view on 'in between': No artist has to give a proof like researchers in hard and soft sciences should do. Art studies include the knowledge of slightly reproducible results. In this thesis the chapter technical procedure shows that reaching a message visible in glass is not a result of coincidence.

The technical investigation made on this master's thesis, glass art and science, is based on a practical research. It is made of a constant search of experimentations, tests. The technical results of this study are described in the fiches techniques [please see page 39]. That is where I describe the methods and techniques, and I show schedules and graphs that I developed and used.

Bringing the three dimensions together shows that scientists and artists are working similar and do not do it only for their own benefit. They continue when they are misunderstood or not accepted during their research or even during their live. Their own motivation can be enough feedback to continue their research and maybe centuries later it is understood that their ideas were beyond societies' understanding during their lifetime.

One needs to be alphabetized to come in contact with written poetry. One needs to be alphabetized to find out how authors were writing about 'in between'.

The attention when reading literature is on the language itself. Reading poems requires slow and caring reading. Furthermore it demands decrypting codes and reading between the lines. From my point of view it seems to be easier the more one reads and the more understanding there is before reading.

One needs to be highly alphabetized to be able to follow scientific theories such as Einstein's mathematical theory of space and time and all the knowledge that results from that. To understand life as a duality between particle and wave reality in macrocosm and microcosm, one truly needs to reach a fairly high level of intellect.

One does not need to be alphabetized to feel art. One does not need to be intellectual to understand art.

This feeling was clearly visible during the exhibition. It is an interactive feeling. Visitors [see figure 83 to 86 on page 81] tried to find out more about my art with all their senses. They saw the unknown and the mysterious creates a reaction: they started thinking, they started comparing with their knowledge about glass, about sounds, about light and reflections. Some tried to lick, many touched. It is just the small mysterious between earlier perception and present perception. For me that was not unexpected. One might think that it was sugar, one might think that it is glowed grains of glass or even plastics. Another might have thought about that strange A4 paper looking almost like hanging wet inside a frame.

An exhibition opening gives the feedback to the artist when he is observing the visitors observing his creation. I could see how they followed my storytelling with glass. Fernando Pessoa was of course a good choice because all this happened in Portugal. Wave and particle duality was not as easy to understand for the visitor but that is no problem at all. Mankind is using any technology resulting from scientific knowledge without understanding it. That mysterious could be called the big mysterious – we trust in the ones with a wider knowledge. We should be thankful to scientist providing us with all these technical devices, that were once just existent in a scientist's brain. We should be thankful to artists giving us an idea about the world not being proof-able. Regardless of their professional backgrounds, regardless of their heritage and regardless of their religions the visitors found themselves in their own 'in between', found themselves as part of a group being exposed to similar feelings created by the exhibition and they discussed about. Looking at them I was feeling good that I reached my aim. My art has always been about communication. For 'in between' it was about communication between art and science. In the end I see this exhibition and this thesis as a stimulus for the visitor, for the reader and also for me. The mysterious of 'in between' could not be clearly defined. It is like with the *manipulated pâte de verre*: one sees it, one tries to understand how it was made and might not get it. But during the exhibition just its message counts and why not to stay 'in between'!

4. Conclusions

*"We worship perfection because we can't have it; if we had it, we would reject it. Perfection is inhuman, because humanity is imperfect."*⁶³

This thesis could just be a small trip into the vast field of 'in between'; I feel myself in there, but I am not a literature critic, I am not a psychologist, I am not as scientist; I am just an artist trying to make the reader understand how all minor knowledge I was gathering is helping to follow me and others into their 'in between'. I hope one could follow my words and I hope one could understand deeper by seeing my art without being influenced by former gathered knowledge. Besides giving answers what 'in between' contains there are clear answers concerning the question if *pâte-de-verre* can be pushed to a higher level - *manipulated pâte-de-verre*.

With this research I can conclude several points:

- We can use different glass compositions to make the *pâte-de-verre* pieces.
- The creation of three dimensional pieces in *pâte de verre* is possible with a rigorous investigation of temperature, moulds and frit size.
- The creation of fiches techniques that can be seen as a manual for future artists.

For me as a designer all projects and theses had the chapter 'future board'. Here it can be the question where this thesis can bring us in future. My inventions and developments concerning the method of bringing grains of glass into forms I desired could be used for visible glass objects made with *manipulated pâte de verre* outside galleries and museums. They do not need to be understood to its deepest roots as explained in this thesis with my works of art; in the end the technical knowledge is the answer, which again is just final until new inventions and developments in glass techniques will be made. My achievement is launching further steps; the bigger audience should just feel good, see its beauty and see more beauty when light touches them.

Regarding future perspectives, I can imagine bringing *manipulated pâte de verre* to a bigger scale. The grains could have sizes up to 2 cm. Big grain chunks do not need another method. The viewer would see the grains clearly in its own chaos. Firing schedules will need to be adjusted. The structure can be so solid to function as windows, even with a three-dimensional shape. Another idea would be to have my *manipulated pâte de verre* used as leadlight windows were used when that technique was popular. It could be placed inside of two glass window panes separated by a vacuum or gas filled space as glaziers do with leadlight in colder climates. [see figure 87 to 89 on page 84 and 85]

My approach to find a definition for 'in between' was just an approach. I tried to come closer to a scientifically proof answer but I am human. If we would live in a world which could get final answers, we would not have any drive to ask more questions. I cannot give an answer to the question that was asked in the beginning of this thesis. I am happy about, because life can continue; my art is not a photo of a status quo made in glass; my thesis is

63 Pessoa, Fernando (2002): *The Book of Disquiet*. Penguin UK. p. 287

not a book to read and then say “now I know”. These further questions to be asked by others at other places at the same time and all the questions that will be asked in future show that the one question asked in the beginning – if the mental state of “in between” does lead artists, scientists, people and societies to creativity and to progress – can be answered with a simple yes.

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6. Fiches Techniques

6.1. Fiche Technique - Flat

Glass



figure 5: Colored Bullseye Frit

Bulleye glass frit with 90 C.O.E. was used in different size (powder, fine medium, coarse) and color (red opal (0124), opaque white opal (0013), deep royal blue transparent (1114), jade green opal (0145), black opal (0100), canary yellow opal (0120), turquoise blue opal (0116) and other green and blue colors). The one mostly used was clear transparent (1101) frit.

Soda Lime Silica glass was used because of its lower melting point ($535^{\circ}\text{C} - 580^{\circ}$) and higher coefficient of expansion and contraction (C.O.E. 94,67), it makes it ideal for certain glass as well as inexpensive glassware. Its raw material composition for 100 gram is 76% SiO_2 – 14% Na_2O flux – 10% CaO as colorant or Al_2O_3 to stabilize.

Kugler powder glass was also used. This glass has a C.O.E. of 96, it is a furnace blown glass. I did use different colors opal bleu (K-172), opal bleu (K-87), turquoise (K- 86), green (K-103) and jade green (K-227).

Mould

Plaster and refractory material (as silica) for making flat shape mold 21 by 29 cm by 2 cm high (for A4 size glass)



figure 6: Thin Layer Ceramic Fiber Paper



figure 7: Frit inside Kiln half Covered with Kiln Paper



figure 8: Piece totally Covered before Firing

Ceramic fibre paper thin layer sheet cut in different size to cover the frit to protect from the extra heat

Engraving

The mould was engraved by hand using dental tools and laser engraver in power 100-speed 05.

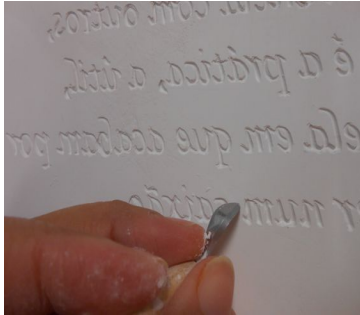


figure 9: Hand Engraving

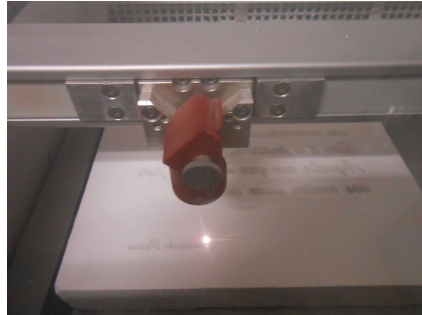


figure 10: Laser Engraving Technology - Working on the Mold - Speedy 100RTM trotec ®



figure 11: Filling the Engraved Part with Frit

Filling

The mould was filled with different sizes of grain trying to get the result of pieces fired with visible grain in very thin layer between 2 to 4 mm.

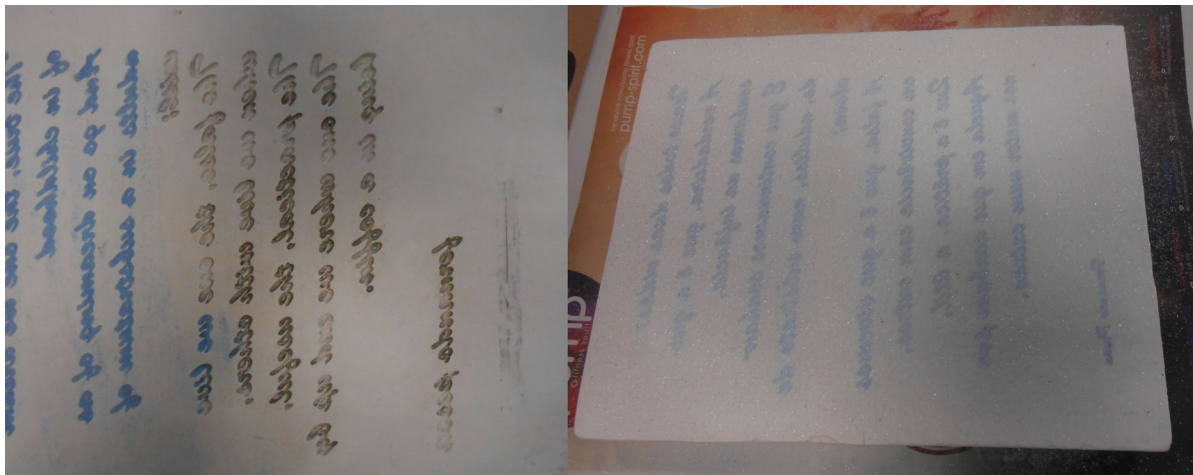


figure 12: Filling the Mould with Frit

Firing

Firing cycle tests and schedule used for tack fusing different size of grain of frit in thin layer

Temperature [°C]	Time [m]
150 °C	70 m
240 °C	80 m
720 °C	90 m
720 °C	90 m
535 °C	150 m
535 °C	60 m
400 °C	120 m
50 °C	30 m

table 1: Firing Schedule 1

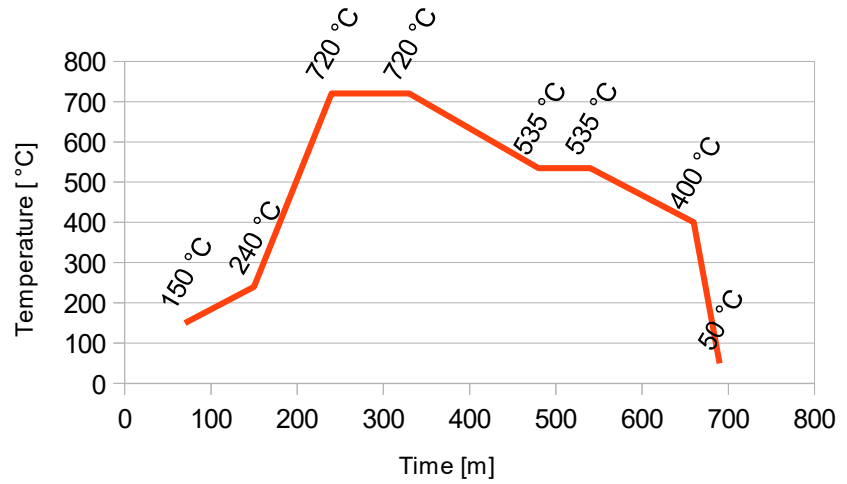


table 2: Firing Schedule 1 - Graph

Results

These experiments showed different results of different grain of frit to see the parts covered and non covered with ceramic fiber paper thickness (3 mm to 6 mm). See samples of thin layer sheet of glass granules.



figure 13: Samples of Thin Layer Sheet of Glass Granules

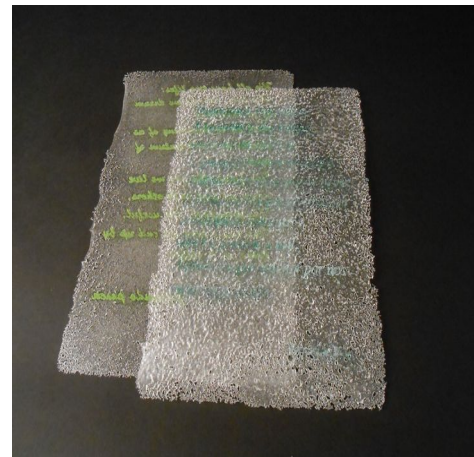


figure 14: A4 Sheet of Glass Powder

6.2. Fiche Technique - Slumping

Glass

Using the thin sheet pieces of glass, which were the result of fiche technique 1

Mould

Here I did use different kinds of mould, which were made out of plaster and silica. Sometimes I add chicken wire or fiber glass to give more stability and to be able to work on them several times. This kind of mould was to bring my art to the third dimension. Another kind of mould was made out of kiln paper, which is soft after firing and has the benefit to take out the piece without braking, when it is too fragile.

Positioning

Positioning of the pieces in the mould plus its cover of ceramic fiber paper from 3 mm to 6 mm



figure 15: Slumping Moulds inside Kiln



figure 16: Example Flat Piece Slumped at 725°C

Firing

for slumping no.1

Temperature [°C]	Time [m]
150 °C	90 m
240 °C	90 m
725 °C	10 m
725 °C	10 m
525 °C	60 m
350 °C	60 m
120 °C	90 m
50 °C	90 m

table 3: Firing Schedule no. 2 for Slumping no. 1

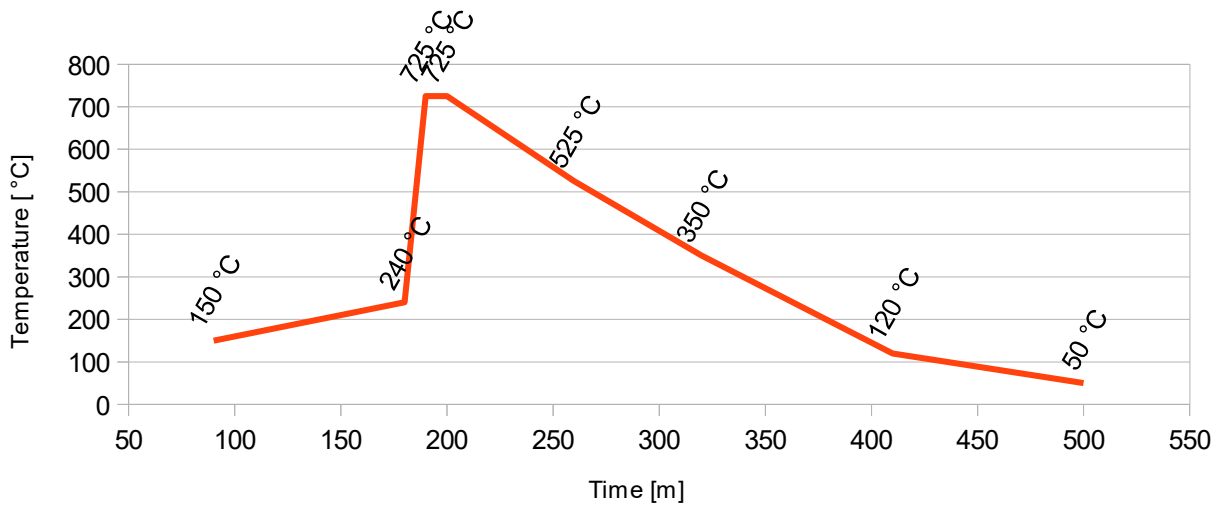


table 4: Firing Schedule no. 2 for Slumping no. 1 - Graph

Results

Result of pieces slumped at a temperature of 725°C and covered by kiln paper, made of Kugler color frit and transparent soda lime silica glass



figure 17: Example 1 Slumping at 725°C

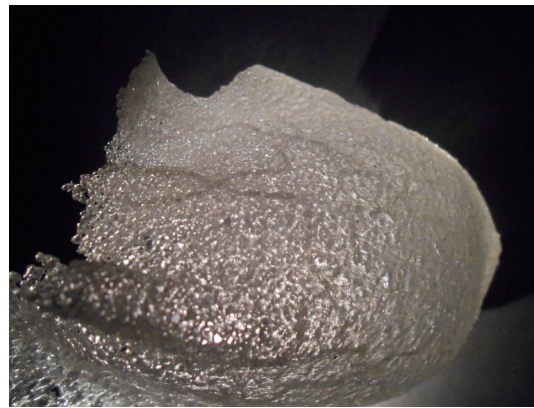


figure 18: Example 2 Slumping at 725°C

Slumping 2

The process is to give form and movement to the flat sheet glass and to glue it by the heat as it can be seen in the object 'Passage de Vie' [see figure 56 on page 60] and 'Reflecting Words' [see figure 60 on page 64].

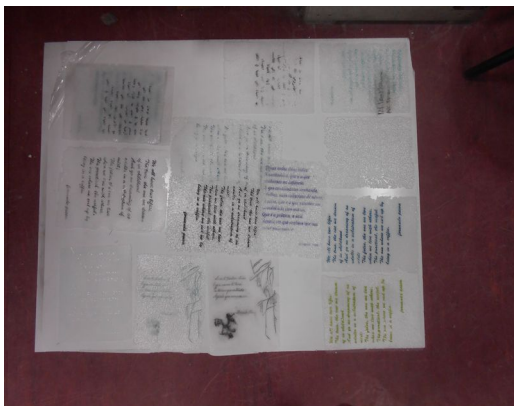


figure 19: Ready Flat Sheet Glass A4



figure 20: Tackfusing Thin Glass Layers to the Book Sculpture Form

Firing

The cycle schedule has a longer annealing time.

Temperature [°C]	Time [m]
250 °C	270 m
400 °C	135 m
540 °C	180 m
735 °C	20 m
540 °C	15 m
540 °C	45 m
270 °C	270 m
100 °C	480 m

table 5: Firing Schedule no. 2 for Slumping no. 2

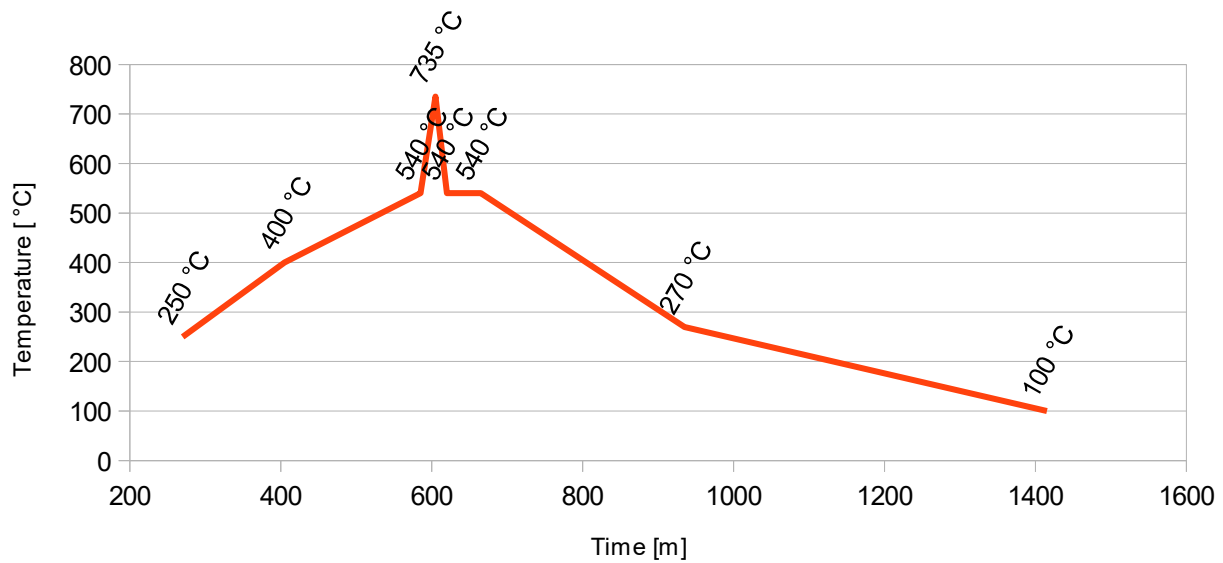


table 6: Firing Schedule no. 2 for Slumping no. 2 - Graph

Results

First having flat thin pieces of glass, then bringing a movement to them and finally gluing them together by heat



figure 21: Example 1 Result Slumping and Heat Gluing



figure 22: Example 2 Result Slumping and Heat Gluing

6.3. Fiche Technique - Rolling

Rolling means personal performance, it is happening inside the kiln at a special temperature range. I had to find out the right temperature. No molds are used for this technique – just hand working/acting movements.

Glass

Thick layers of glass sheets already made (see fiche technique 6.1.) are used.

Mould

Just thin layer ceramic kiln paper sheets of 6 mm are used.

Performance



figure 23: Rolling inside Kiln with Tweezers



figure 24: Rolling inside Kiln with Gloves

The slumping of flat *pâte de verre*, being already the final stage for objects like 'Reflecting Words' [see figure 60 on page 64], was the intermediate technique in this procedure. Another method was needed to reach results like the one to be seen on the invitation card [see figure 47 on page 55], the exhibition flyer or on the first side of the exhibition catalog. At 730°C I opened the kiln and did bring the glass to the form I wanted. That had to be done as fast as possible not to drop the temperature. Safety wear (jacket, gloves and helmet) was used for protection; with my hands or tweezers (for smaller edges) I did bring the glass into the desired form. That had to be done as fast as possible not to drop the temperature.

Firing	Temperature [°C]	Time [m]
	150 °C	90 m
	240 °C	80 m
	730 °C	40 m
	730 °C	10 m
	535 °C	150 m
	460 °C	180 m
	350 °C	180 m
	100 °C	60 m

table 7: Firing Schedule for Rolling

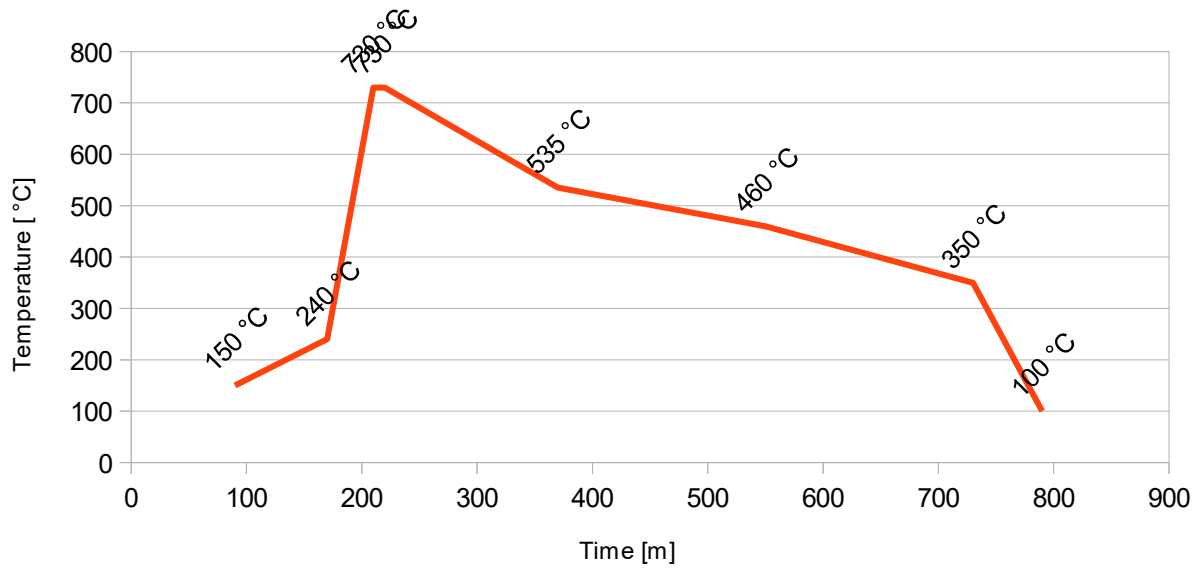


table 8: Firing Schedule for Rolling - Graph

Results

Developing this technique was possible with a lot of practice in fast moving but still working precisely under these extreme conditions.



figure 25: Rolling Result Example 1



figure 26: Rolling Result Example 2

6.4. Fiche Technique - Three-Dimensional Objects

Glass

bullseye large and medium frit transparent

Mould

2,5 cm thick ceramic fiber blanket – dense to make closed fiber mould



figure 27: Ceramic Fiber Blanket

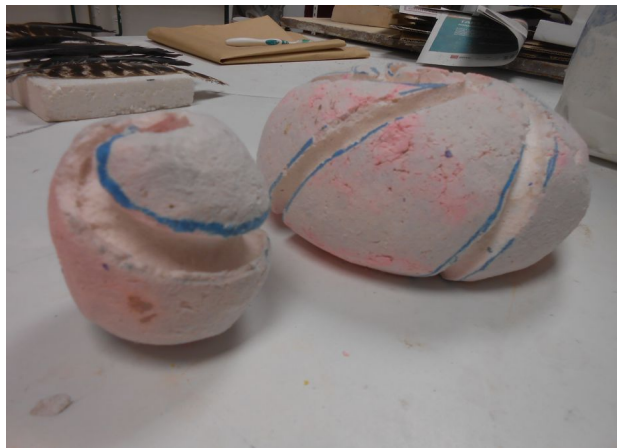


figure 28: 3D Ceramic Fiber Blanket Mould

Firing

Temperature [°C]	Time [m]
150 °C	210 m
240 °C	120 m
740 °C	80 m
740 °C	80 m
540 °C	180 m
540 °C	150 m
265 °C	180 m
100 °C	120 m

table 9: Firing Schedule for Three-Dimensional Objects

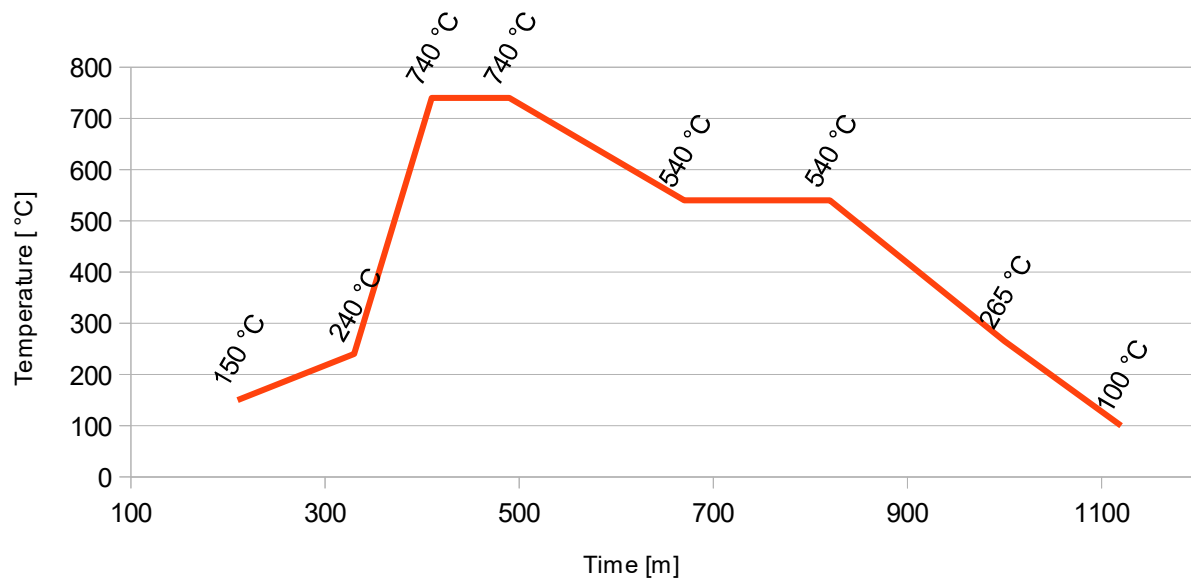


table 10: Firing Schedule for Three-Dimensional Objects - Graph

Results



figure 29: Result: Example from 3D Ceramic Fiber Mould

6.5. Fiche Technique - Sand Casting

Glass

furnace glass and ready glass sheets from fiche technique 6.1. (flat *pâte de verre*)

Mould

One needs clean sand; it can be olivine sand (green), the strongest against the heat. It does not stick to hot glass because it contains little bentonite clay (7%). The other possibility is silicate sand (93% sand) containing 7% bentonite. It creates a good powder for casting, it does not break the form. The form is prepared inside the humid sand mould. A vent is needed too. Graphite is sprayed on the top or we carbonize the mould with an acetylene flame with a torch giving black smoke to avoid glass sticking to the sand.

Heating

My aim was not to do sand casting as it is known. I wanted my flat *pâte de verre* object to be part of it. I had to heat it and place it on the sand mould right the moment when pouring the liquid glass.

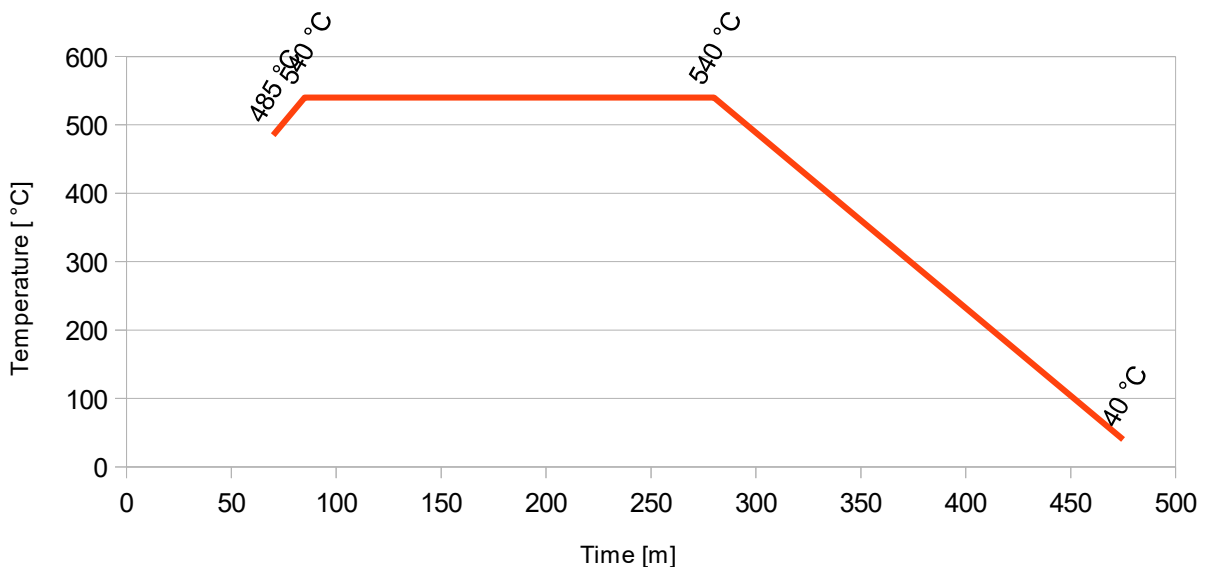


table 11: Kiln Schedule to heat Pâte de Verre Piece for Sand Casting - Graph

Process

Putting the hot *pâte de verre* sheet into the mold; then the casting process starts by pouring the hot glass from furnace into the mould. Sometimes we heat up the ready cast piece with a torch and then it goes directly to the annealer. From high temperature (superior strain point) going down slowly to a lower temperature annealing.

Temperature [°C]	Time [m]
485 °C	70 m
540 °C	15 m
540 °C	195 m
40 °C	195 m

table 12: Kiln Schedule to heat Pâte de Verre Piece for Sand Casting

Temperature [°C]	Time [m]
485 °C	5 m
485 °C	390 m
485 °C	150 m
380 °C	135 m
380 °C	270 m
45 °C	300 m
30 °C	120 m
20 °C	150 m

table 13: Annealing Schedule

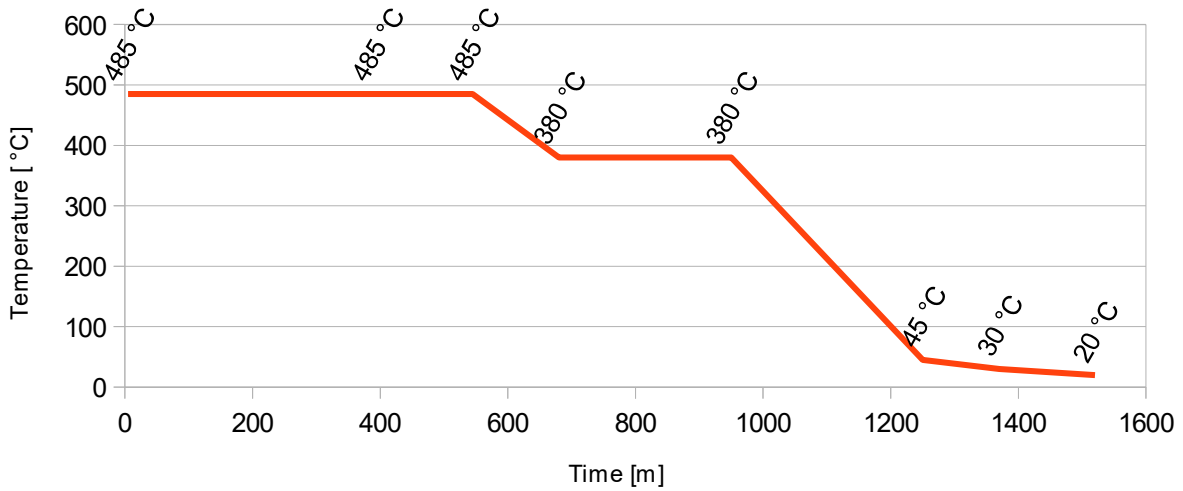


table 14: Annealing Schedule - Graph



figure 30: Carbonizing the Mould



figure 31: Picking up Hot Glass Sheet



figure 32: Placing in Mould

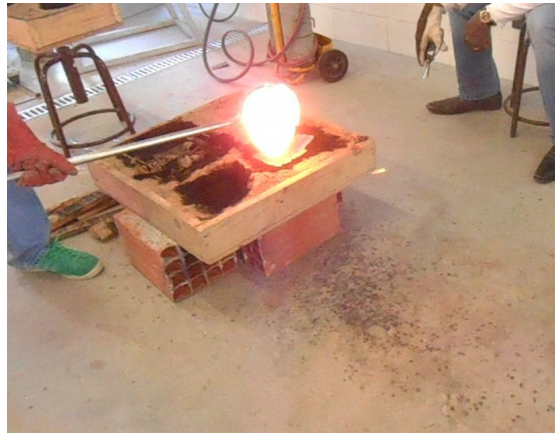


figure 33: Pouring Molten Glass



figure 34: Heating up after Pouring the Molten Glass



figure 35: Taking Glass Piece to Annealer

Results

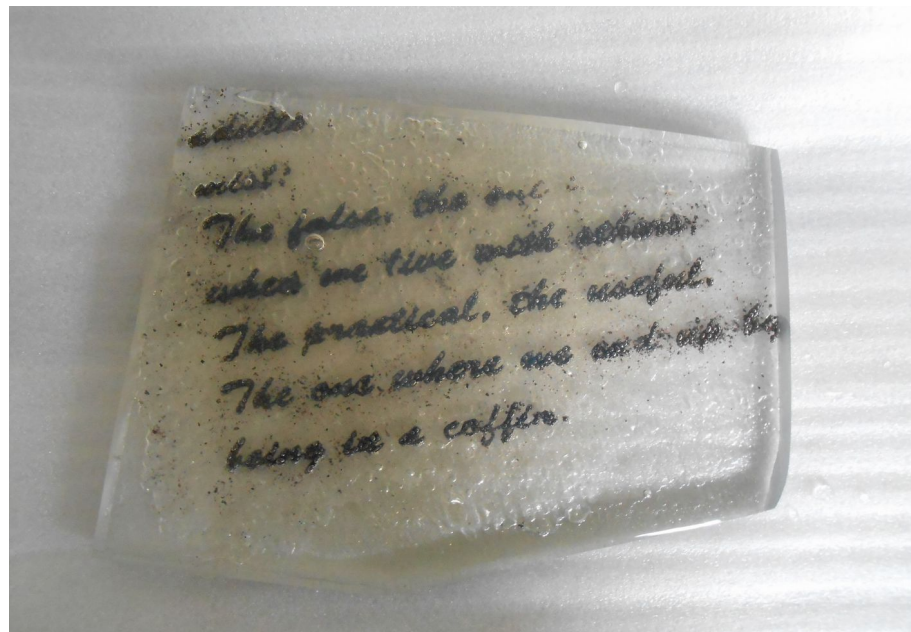


figure 36: Sand Casted Object

6.6. Additional Fiches Techniques

Ceramic

Adding a ceramic plate as another material to the glass creates a contrast and ambient atmosphere.

I did use white earthenware clay. Made my model plate and fired the bisque at temperature of 950 °C. After that I glazed it with 'Glossy gold' 9541 at high temperature of 1040 °C. Ceramic work is typically fired twice: for bisque and then glaze. The goal of bisque firing is to convert earthenware to a durable, semi-vitrified porous stage that it can be safely handled during the glazing and decorating process.



figure 37: Modeled Plate before Firing

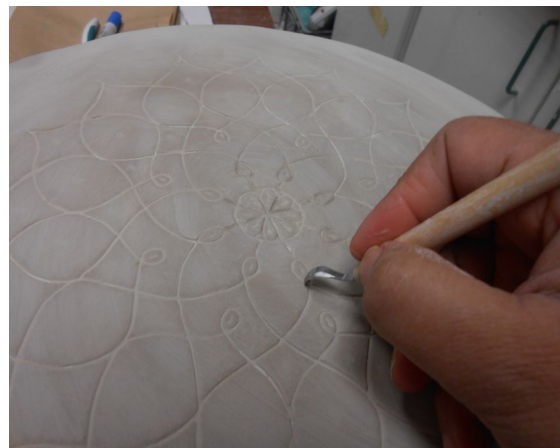


figure 38: Bisque Plate Fired at 950°C



figure 39: Glazed Plate with Glossy Gold



figure 40: Glaze Used

Mirror

The chemical process of silvering means coating glass with a reflective substance. A clear blown glass piece already engraved with a laser was cleaned with ethanol to avoid any dust. The chemical solution (distilled water + silver nitrate AgNO_3 + aqueous ammonia NH_3 + potassium hydroxide KOH + nitric acid HNO_3) was poured into it and I stirred until I saw the mirror appearing on the surface.

Chemical reactions:

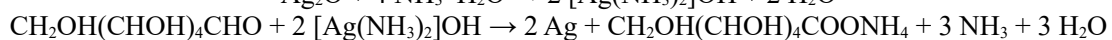
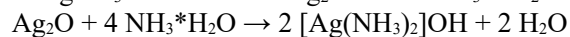
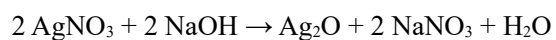


figure 41: Laboratory Experiment



figure 42: Preparing Solution



figure 43: Mirror Coated Piece

Wood

An artist has to think about which material suits the art or goes together with a piece because of aesthetic reasons. In my case I choose wooden boxes and a frame to hold the fragile pieces.

I worked with plywood of 6 mm and 1 cm; painted it black and included LED light.



figure 44: Paint



figure 45: Wooden Stand



figure 46: Wooden Frame

Appendix

I. Exhibitions

INVITATION



figure 47: Invitation Card Exhibition Opening – postcard size

LOCATION

Algerian Embassy Lisboa



figure 49: Algerian Embassy Lisboa 1



figure 48: Algerian Embassy Lisboa 2



figure 50: Algerian Embassy Lisboa 3

Galeria Belas-Artes Lisboa



figure 51: Galeria Belas-Artes Lisboa 1



figure 52: Galeria Belas-Artes Lisboa 2



figure 53: Galeria Belas-Artes Lisboa 3

EXHIBITION FLYER

لدينا جميعا نوعان من الحياة:
حياة حقيقية، وهي تلك التي
نحلم بها في طفولتنا، وتلك التي
نستمر في الحلم بها كبارًا، وخلصنا
أرضية من الضباب، أما الحياة
الخالطة، فهي تلك التي نتقاسمها
مع الآخرين، إنها، الحياة
العملية، إنها الحياة المفيدة،
إنها الحياة التي ننهينا في الكفن.

فرناندو بيسوا

*Temos todos duas vidas:
A verdadeira, que é a que
sonhamos na infância,
E que continuamos sonhando,
adultos, num substrato de névoa;
A falsa, que é a que vivemos em
convivência com outros,
Que é a prática, a útil,
Aqueela em que acabam por nos
meter num caixão.*

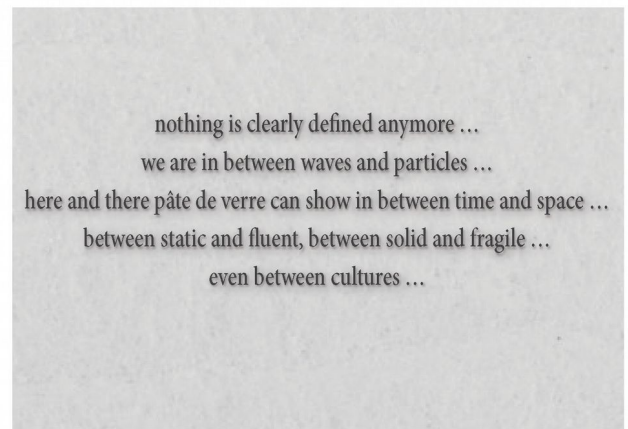
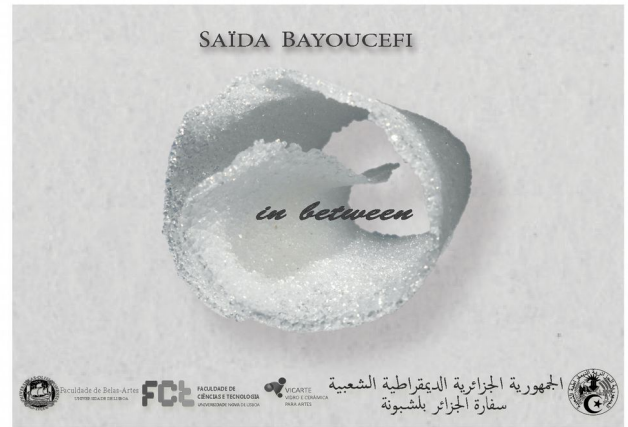
Fernando Pessoa

*Nous avons tous deux vies :
la vraie, celle que nous avons
rêvée dans notre enfance,
et que nous continuons à rêver,
adultes sur un fond de brouillard;
la fausse, celle que nous vivons
dans nos rapports avec les autres,
qui est la pratique, l'utile,
celle où l'on finit par nous mettre
au cercueil.*

Fernando Pessoa

*We all have two lives:
The true, the one we dream
of in childhood
And go on dreaming of as
adults in a substratum of
mist;
The false, the one we live
when we live with others,
The practical, the useful,
The one where we end up by
being in a coffin.*

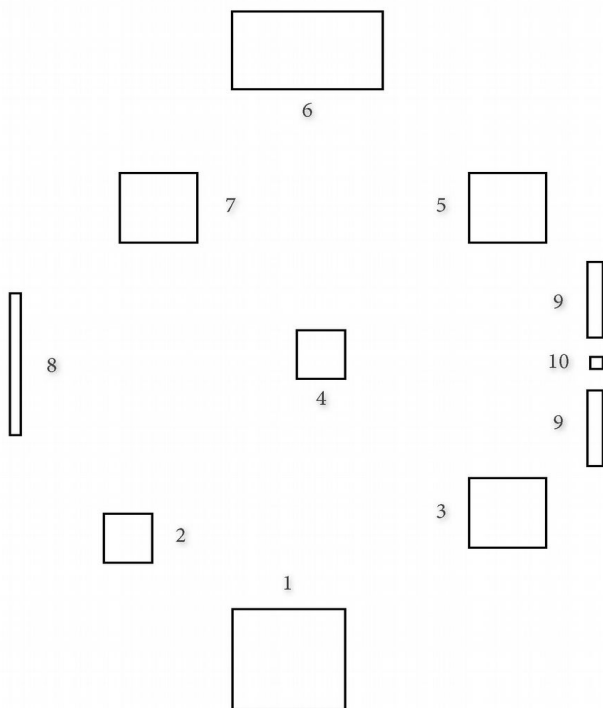
fernando pessoa



back

figure 54: Folded Exhibition Flyer A4

front



inside left

figure 55: Folded Exhibition Flyer A4

inside right

- 1
PASSAGE DE VIE
- 2
SENSIBILITÉ & FRAGILITÉ
- 3
AT 730 °C
- 4
WORK IN PROGRESS (VIDEO)
- 5
REFLECTING WORDS
- 6
CE QUI RESTE
- 7
LA VIE A TRAVERS LE VERRE
- 8
RELIVING PAPERS
- 9
SAME TIME / DIFFERENT LIFE
- 10
IN BETWEEN DIFFERENT MOMENTS

II. Art Pieces



figure 56: PASSAGE DE VIE (2016) glass 40 x 20 x 27 cm

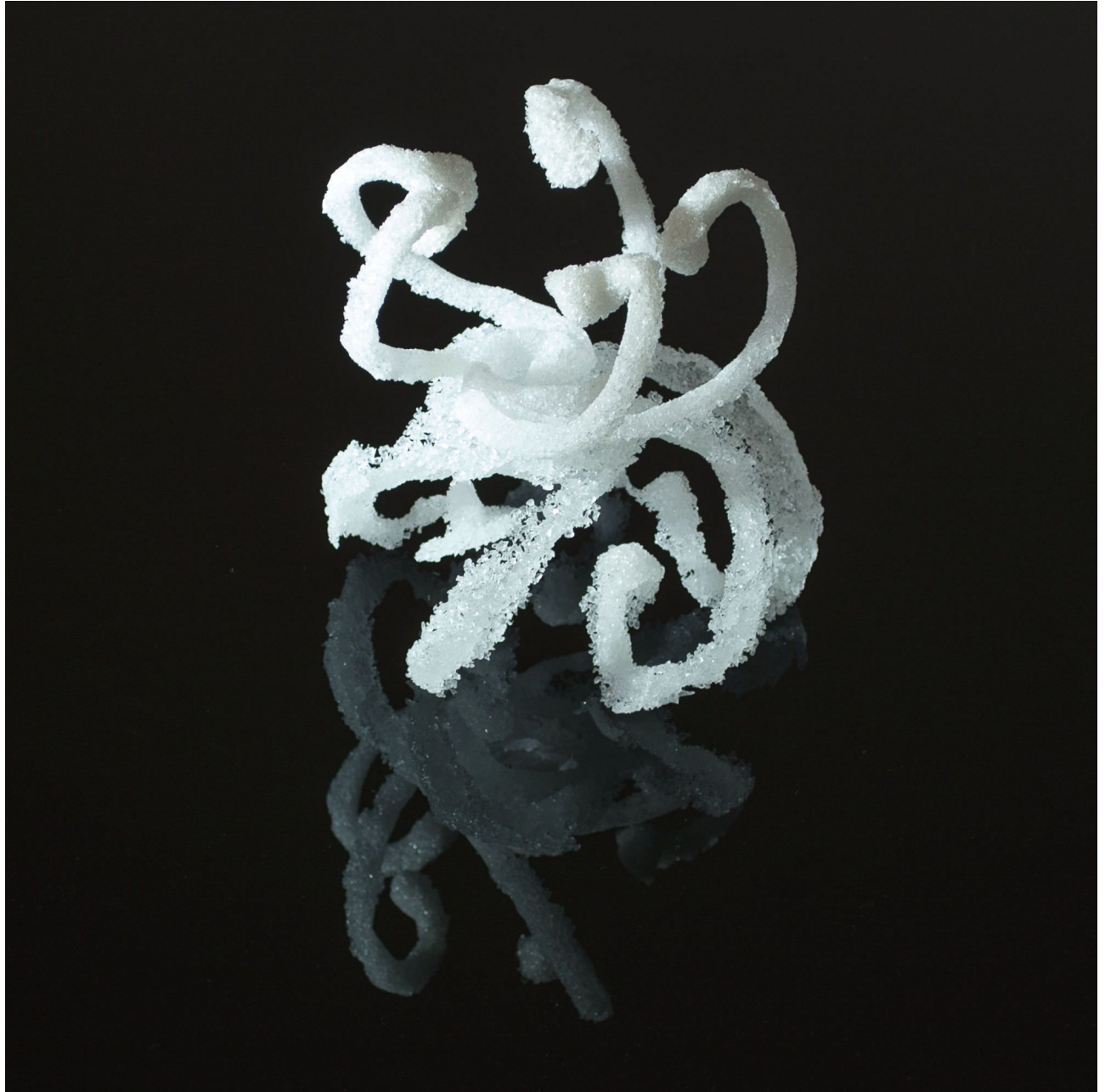


figure 57: SENSIBILITÉ & FRAGILITÉ (2016) glass 20 x 20 x 20 cm



figure 58: AT 730°C (2016) glass 55 x 31 x 13 cm

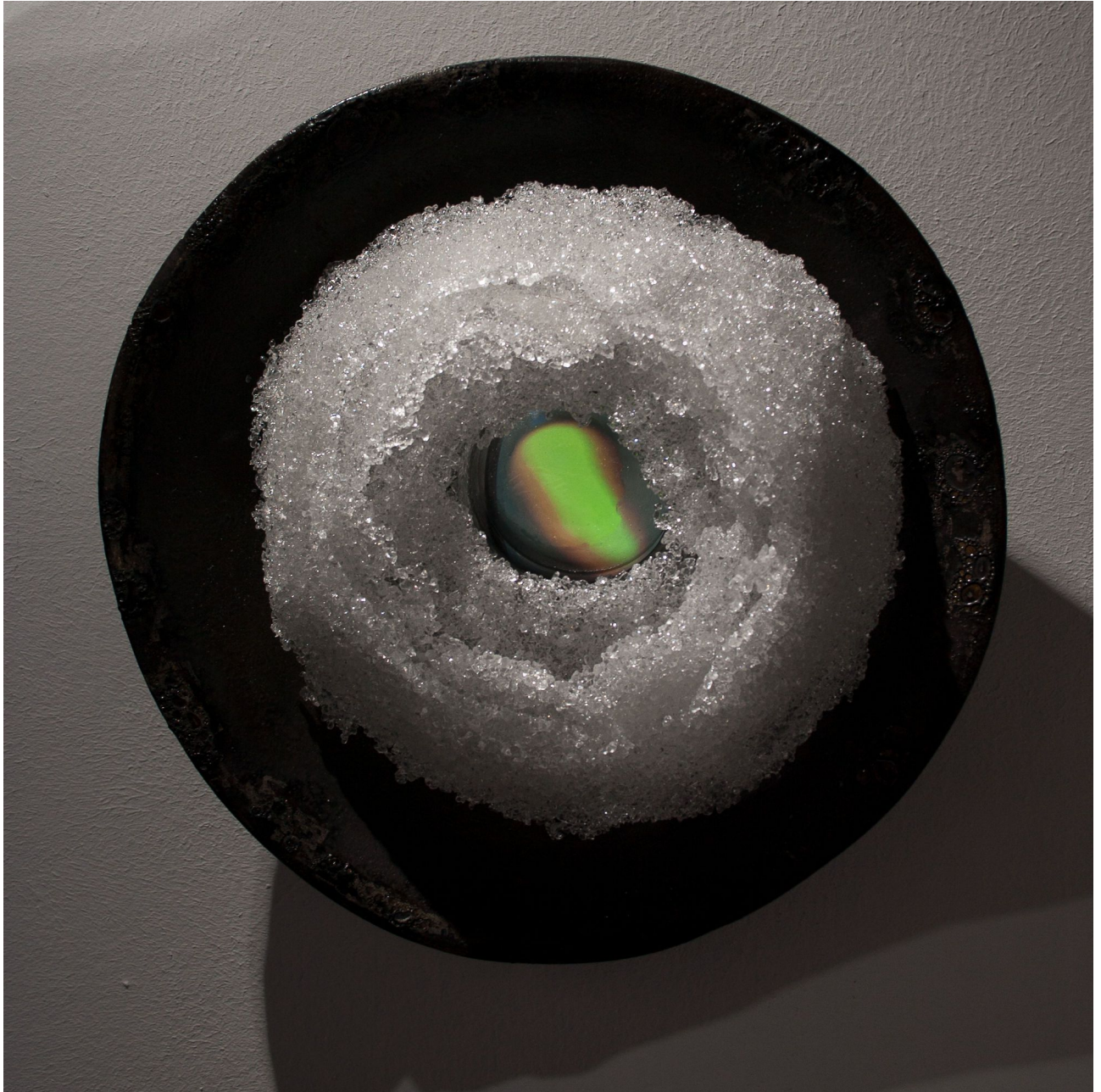


figure 59: WORK IN PROGRESS (VIDEO) (2016) glass, ceramic, video Ø 30 cm h 11 cm



figure 60: REFLECTING WORDS (2016) glass, mirror 39 x 31 x 24 cm



figure 61: LA VIE A TRAVERS LE VERRE (2016) glass, wood, light 38 x 38 x 6 cm



figure 63: SAME TIME / DIFFERENT LIFE (2016) glass, wood 46 x 46 x 14 cm



figure 64: IN BETWEEN DIFFERENT MOMENTS (2015) glass, h 12 cm

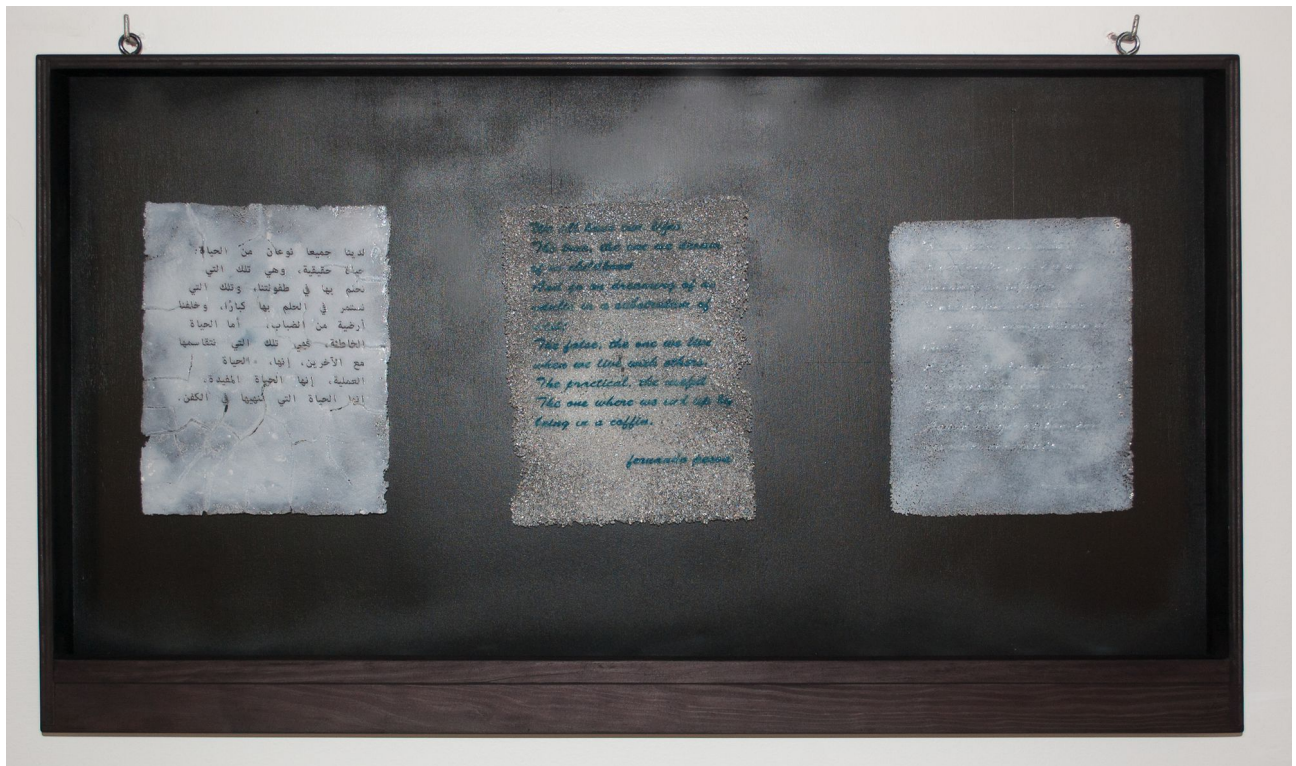


figure 65: RELIVING PAPERS (2016) glass, wood 110 x 65 cm

III. Figures

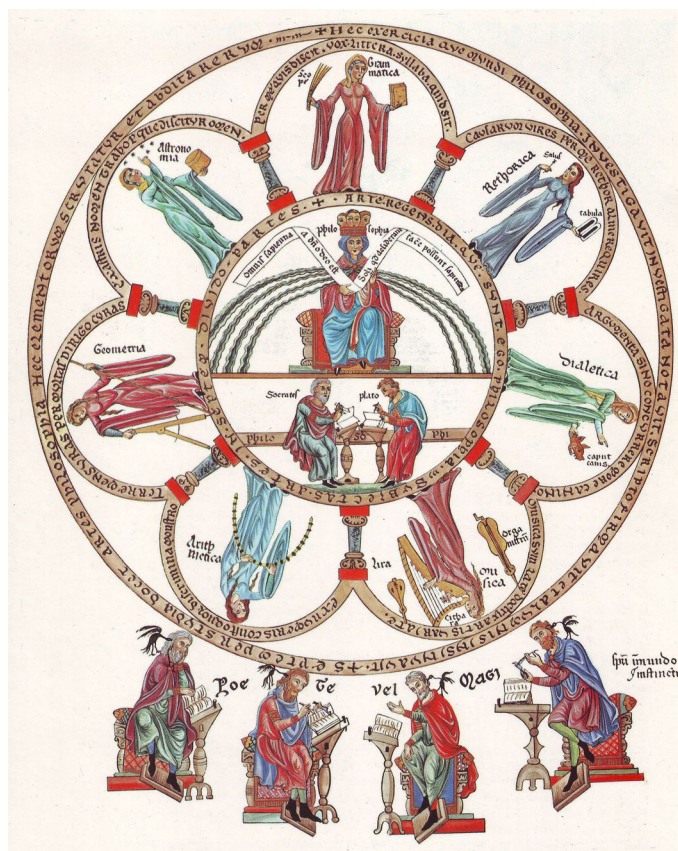
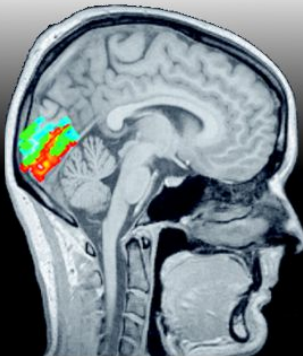



figure 66: Hortus Deliciarum - Philosophy and the Seven Liberal Arts



I have a dream
Rev. Dr. Martin Luther King



me too
Saïda

expo saïda bayoucefi
glass art and science

opening 09.06.14 17:30

universidade nova de lisboa
faculdade de ciências e tecnologia
campus de caparica
library
920 214 965






figure 67: Exhibition Card (2014), postcard size

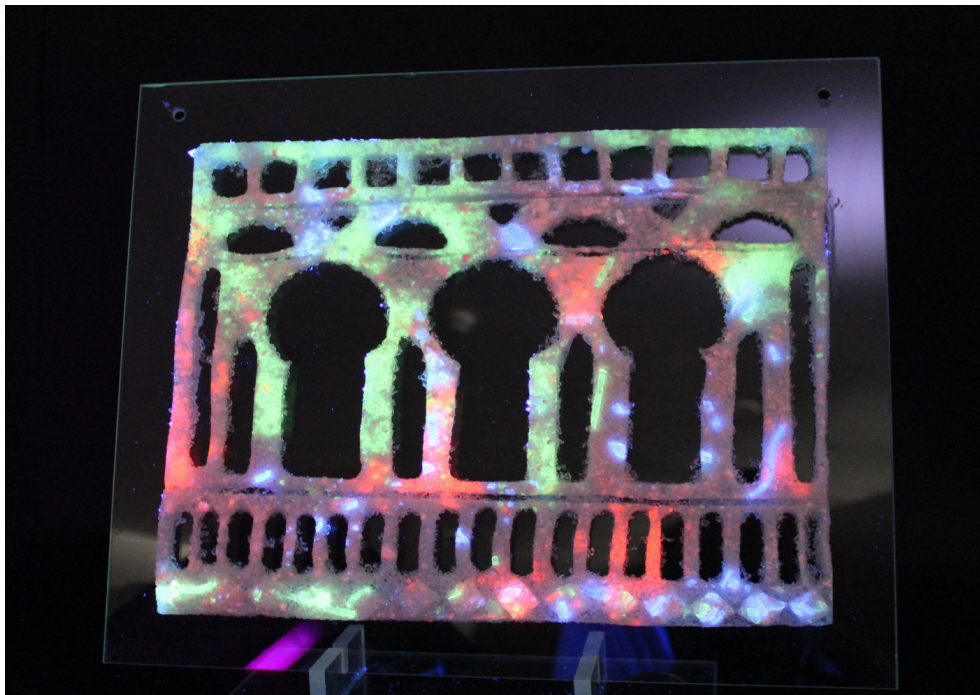


figure 68: Passage (2014) glass 25 x 37 cm

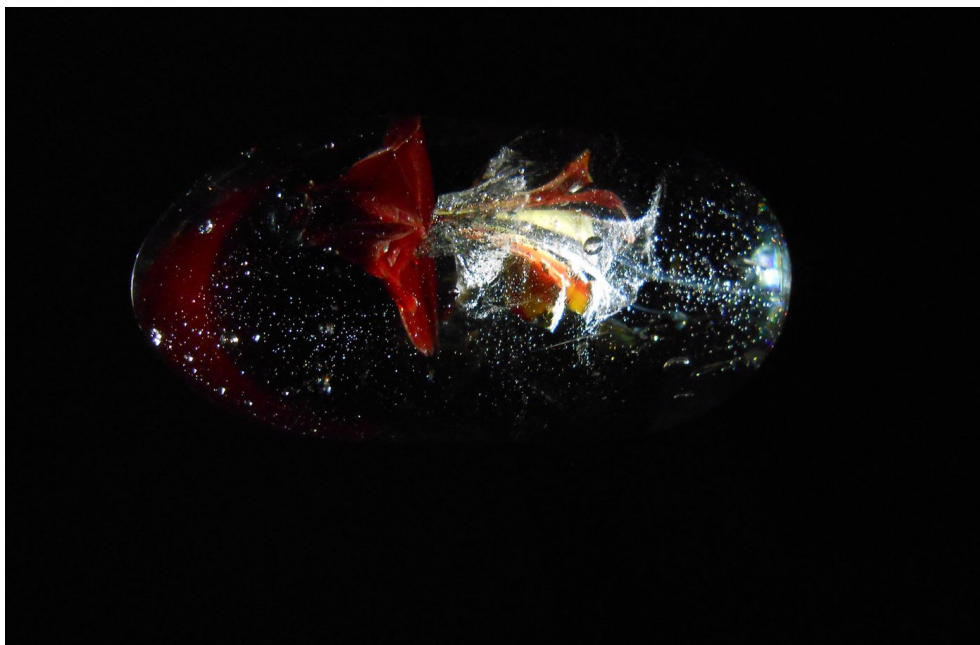


figure 69: Unique Univers (2014) solid glass (impact) rolled in dust colored glass 1 10 cm Ø 5 cm

Presença

fôlha de arte e crítica
coimbra, julho, 1933

TaBaCaRia

Não sou nada.
Nunca serei nada.
Não posso querer ser nada.
Aparte isso, tenho em mim todos os sonhos do mundo.

Janelas do meu quarto,
Do meu quarto de um dos milhões do mundo que ninguém
sabe quem é
(E se soubessem quem é, o que saberiam?),
Dais para o mistério de uma rua cruzada constantemente
por gente,
Para uma rua inacessível a todos os pensamentos,
Real, impossivelmente real, certa, desconhecidamente certa,
Com o mistério das coisas por baixo das pedras e dos seres,
Com a morte a pôr humidade nas paredes e cabelos brancos
nos homens,
Com o Destino a conduzir a carroça de tudo pela estrada de
nada.

Estou hoje vencido, como se soubesse a verdade.
Estou hoje lúcido, como se estivesse para morrer,
E não tivesse mais irmandade com as coisas
Senão uma despedida, tornando-se esta casa e este lado da
rua
A fileira de carruagens de um comboio, e uma partida api-
tada
De dentro da minha cabeça,
E uma sacudida dos meus nervos e um ranger de ossos
na ida.

Estou hoje perplexo, como quem pensou e achou e esqueceu.
Estou hoje dividido entre a lealdade que devo
À Tabacaria do outro lado da rua, como coisa real por fora,
E a sensação de que tudo é sonho, como coisa real por dentro.

Falhei em tudo.
Como não fiz propósito nenhum, talvez tudo fosse nada.
A aprendizagem que me deram,
Desci dela pela janela das traseiras da casa.
Fui até ao campo com grandes propósitos.
Mas lá encontrei só ervas e árvores,
E quando havia gente era igual à outra.

Saio da janela, sento-me numa cadeira. Em que hei-de
pensar?

Que sei eu do que serei, eu que não sei o que sou?
Ser o que penso? Mas penso ser tanta coisa!
E há tantos que pensam ser a mesma coisa que não pode
haver tantos!

Génio? Neste momento
Cem mil cérebros se concebem em sonho génios como eu,
E a história não marcará, quem sabe?, nem um,
Nem haverá senão estrume de tantas conquistas futuras.
Não, não creio em mim.

Em todos os manicómios há doidos malucos com tantas cer-
tezas!
Eu, que não tenho nenhuma certeza, sou mais certo ou
menos certo?

Não, nem em mim...
Em quantas mansardas e não-mansardas do mundo
Não estão nesta hora génios-para-si-mesmos sonhando?
Quantas aspirações altas e nobres e lúcidas —
Sim, verdadeiramente altas e nobres e lúcidas —,
E quem sabe se realizáveis,
Nunca verão a luz do sol real nem acharão ouvidos de gente?
O mundo é para quem nasce para o conquistar
E não para quem sonha que pode conquistá-lo, ainda que
tenha razão.

Tenho sonhado mais que o que Napoleão fez.
Tenho apertado ao peito hipotético mais humanidades do
que Cristo.

Tenho feito filosofias em segredo que nenhum Kant escreveu.
Mas sou, e talvez serei sempre, o da mansarda,
Ainda que não more nela;
Serei sempre o que não nasceu para isso;
Serei sempre só o que tinha qualidades;
Serei sempre o que esperou que lhe abrissem a porta ao pé
de uma parede sem porta,

E cantou a cantiga do Infinito numa capoeira,
E ouviu a voz de Deus num póco tapado.
Crer em mim? Não, nem em nada.
Derrame-me a Natureza sobre a cabeça ardente
O seu sol, a sua chuva, o vento que me acha o cabelo,
E o resto que venha se vier, ou tiver que vir, ou não venha.
Escravos cardíacos das estrélas,
Conquistámos todo o mundo antes de nos levantar da cama;

10
3
18

ano sétimo 39 volume segundo

figure 70: TaBaCaRia. in Presença [Magazine], fôlha de arte e crítica. Coimbra. julho, 1933



figure 71: Ever Turning Circles - Graphics (2016)



figure 72: Pessoa's Wooden Trunk

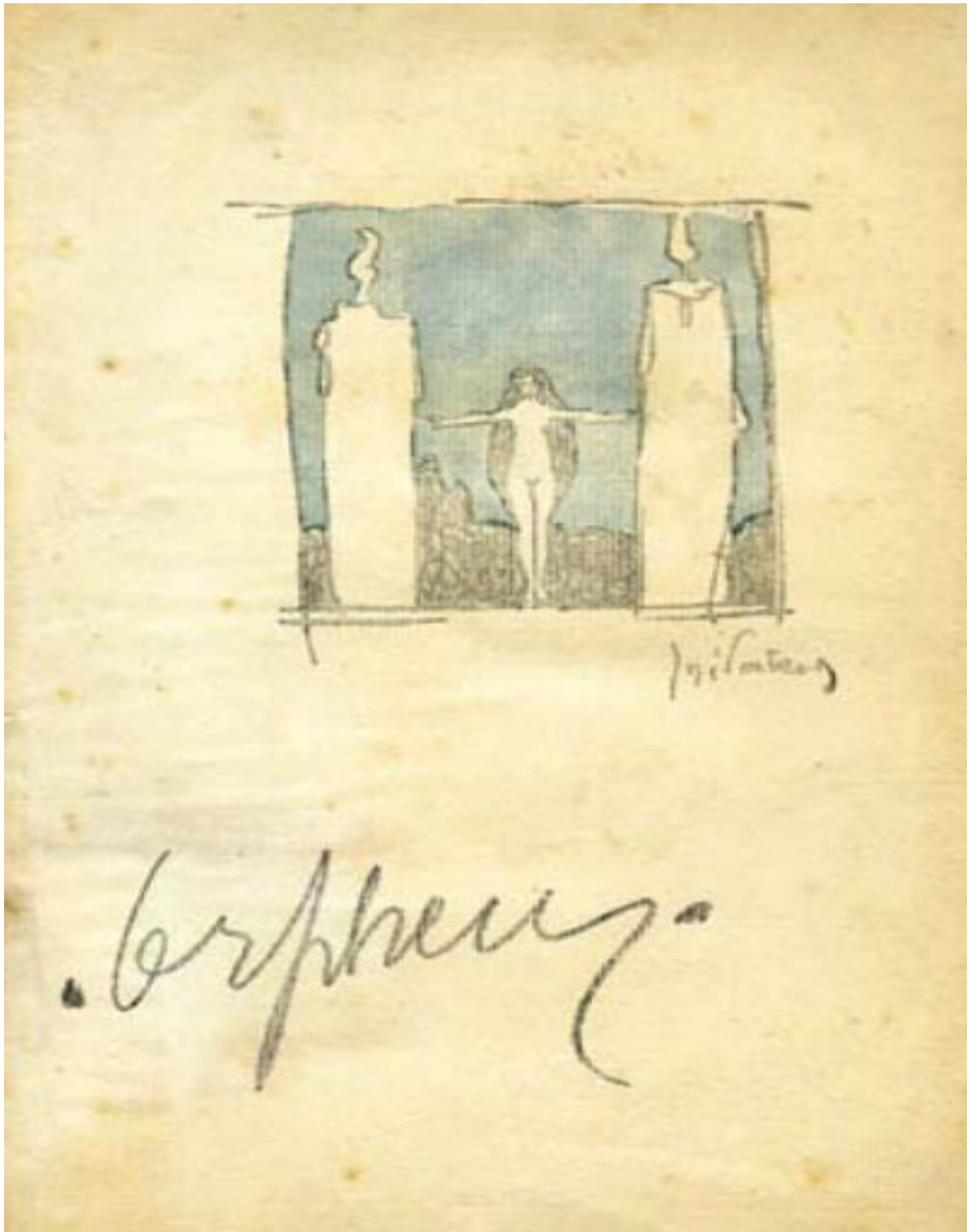


figure 73: Capa do nº1 da revista Orpheu

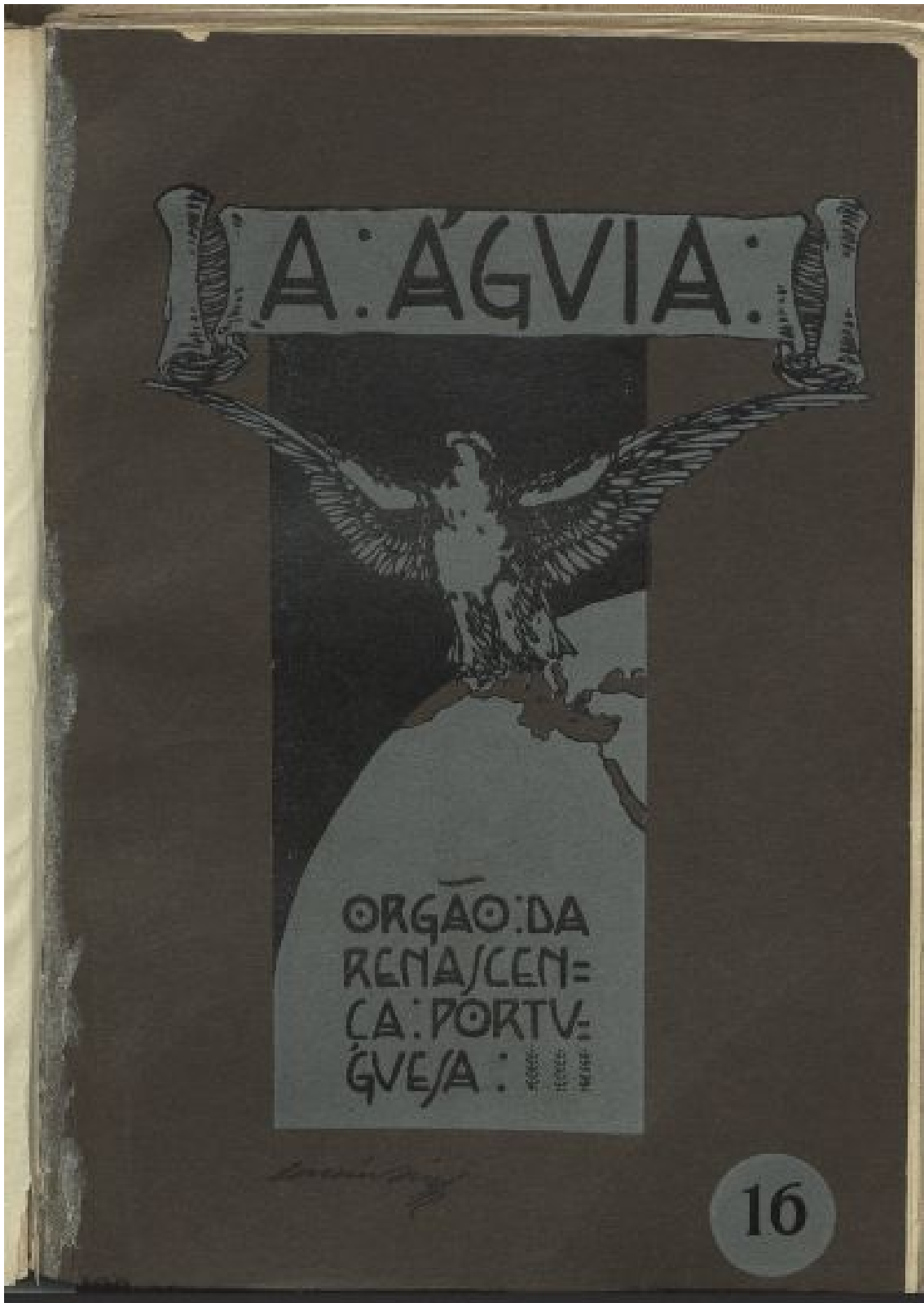


figure 74: A Águia nº 16 série II. Porto. April 1913

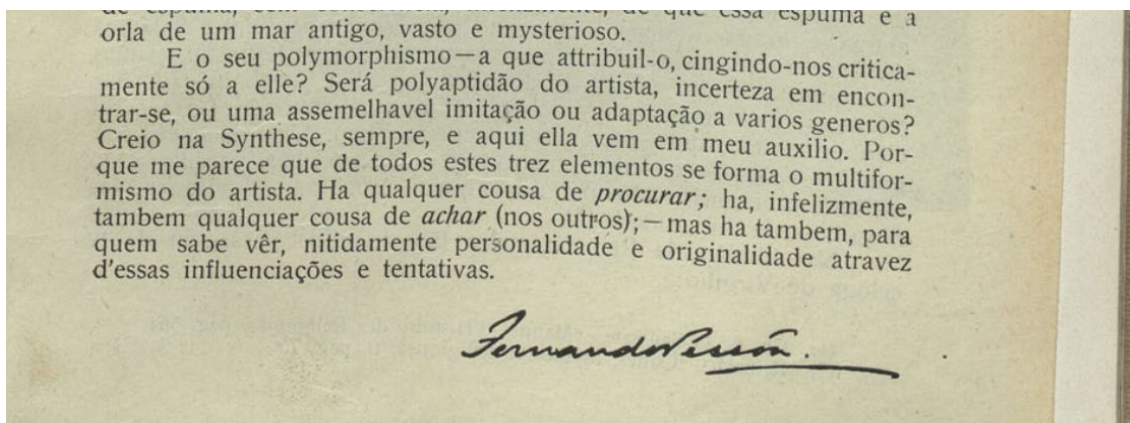


figure 75: As Caricaturas de Almada Negreiros. A Águia n° 16 série II. Porto. April 1913

ANNALEN DER PHYSIK.

VIERTE FOLGE. BAND 49.

1. *Die Grundlage der allgemeinen Relativitätstheorie;* von *A. Einstein.*

Die im nachfolgenden dargelegte Theorie bildet die denkbar weitgehendste Verallgemeinerung der heute allgemein als „Relativitätstheorie“ bezeichneten Theorie; die letztere nenne ich im folgenden zur Unterscheidung von der ersteren „spezielle Relativitätstheorie“ und setze sie als bekannt voraus. Die

figure 76: Einstein's Original of 'The Foundation of the General Theory of Relativity'

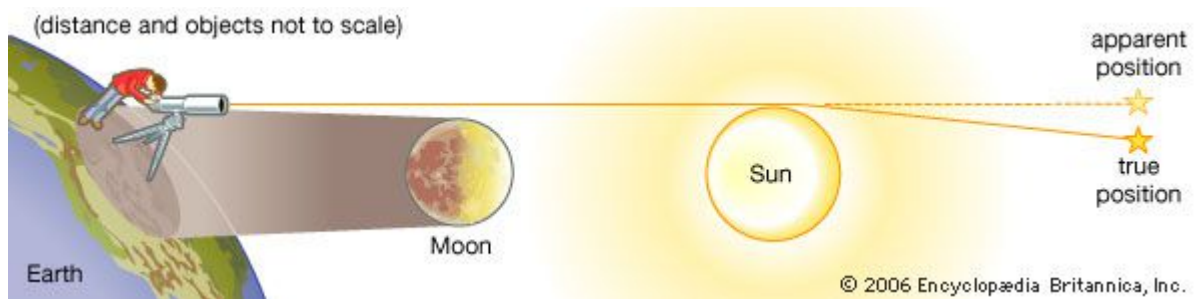


figure 77: Experimental Evidence for General Relativity

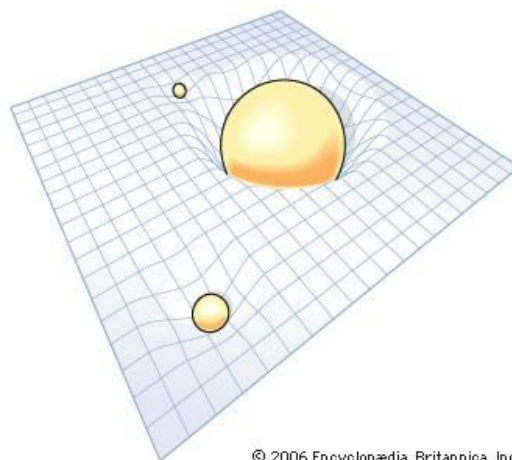


figure 78: Curved Space-Time

LIGHTS ALL ASKEW IN THE HEAVENS

Men of Science More or Less
Agog Over Results of Eclipse
Observations.

EINSTEIN THEORY TRIUMPHS

Stars Not Where They Seemed
or Were Calculated to be,
but Nobody Need Worry.

figure 79: New York Times Headline Nov 10 1919

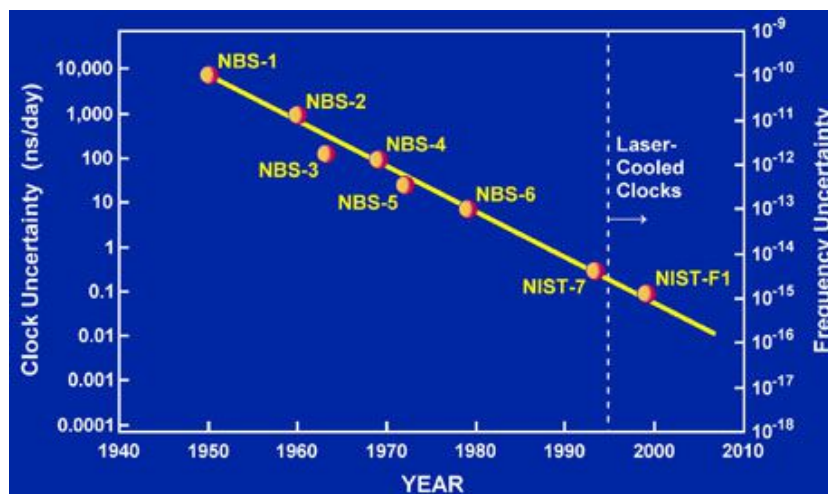


figure 80: Atomic Clock Accuracy



figure 81: Japanese Rock Garden



figure 82: Glass Crushing Machine



figure 83: Visitor 1



figure 84: Visitor 2

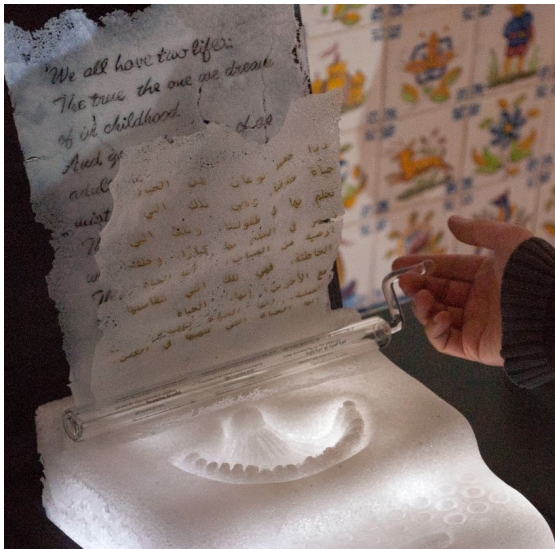


figure 85: Visitor 3



figure 86: Visitor 4

Size of Grain

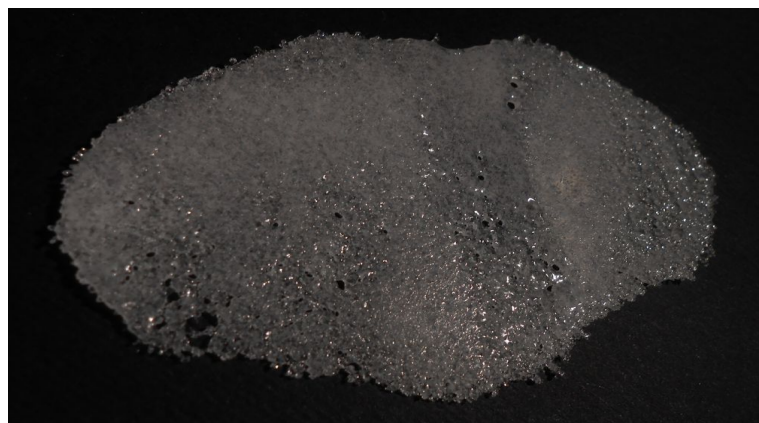
Frit Samples

Fired Samples

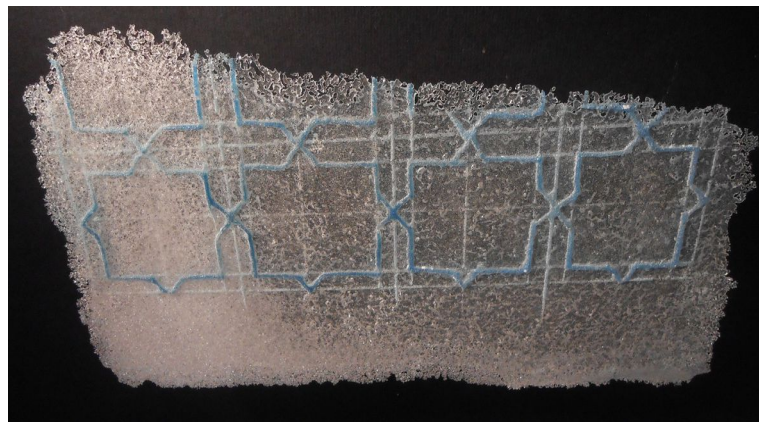
mesh 15
large



mesh 30
medium



mesh 50
fine

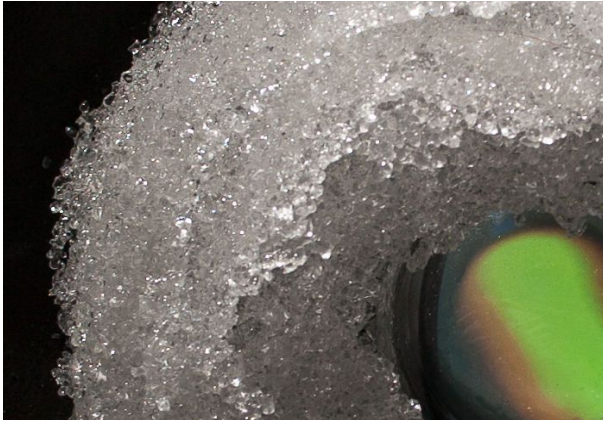


mesh 100
powder

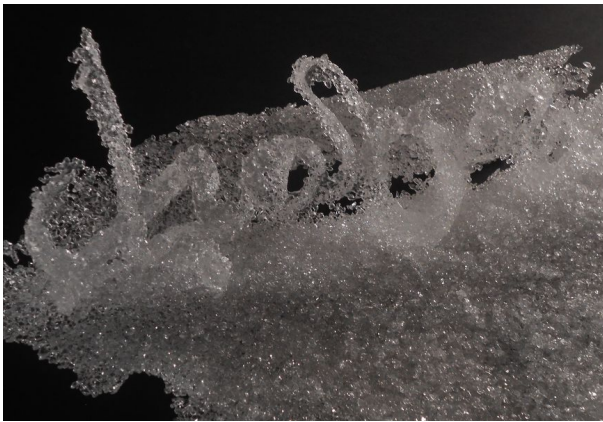


Final Objects

Comments



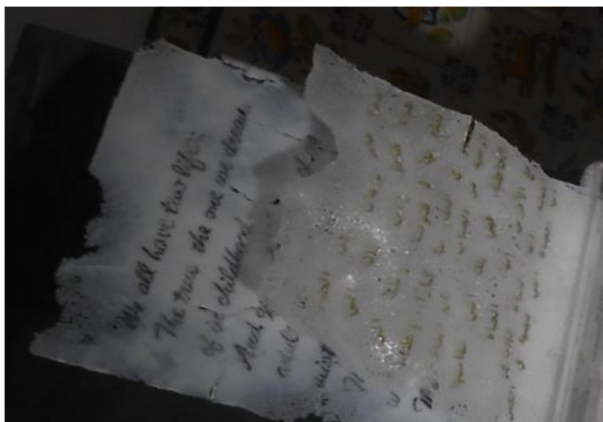
In this piece I used big grain frit in three layers as a spiral. The layers are touching each other just in the bottom. These big grains reflect more light.



This piece is made of medium grains. The medium grains were the ones most successful for the rolling step. This result shows the fluent form. It has an extra word piece on top glued by tack fusing which means glued to it by firing.



This result shows the piece in different texture; where parts were covered with kiln paper, it is more rough and not transparent and grains are still visible, in another part of it we can see the same size grain is fused and transparent because there it was not covered while firing.



These pieces are the most fragile ones because of the very fine powder. They almost look like the dust from glass and it shows kind of glossy and opaque texture as one can see in sample half covered with kiln paper: it gives the opaque effect. Less covered it shows the glossy part reflecting light.



figure 87: Futureboard: Modern Chapel with Relief Pâte de Verre Window



figure 88: Futureboard: Modern Architecture Mosque with Relief Pâte de Verre Window



figure 89: Futureboard: Mosque with Relief Pâte de Verre Window

IV. Declaration of Authenticity

I declare that this dissertation is my original work, gathered and utilized especially to fulfill the purposes and objectives of this study, and has not been previously submitted to any other university for a higher degree.

