

3D Software Animated Mind Mapping,
where are we not standing?

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"There is a difference between knowing the path and walking the path ". Matrix.

"Every act of creation is first an act of destruction". Picasso

Introduction:

Mind Maps' concept has been introduced by Tony and Barry Buzan. Mind Maps is a registered Trademark of Buzan Organization. Mind Maps is an expression of radial thinking and therefore a natural function of human mind¹. A Mind Map has four attributes²:

1. Capture of the object of attention in a central image.
2. The objects main topics radiate away from the center like branches.
3. The branches contain key images or words written on a line connected to the central image. Subtopics are written on lower branches. These branches are then connected to the higher branches containing higher level topics.
4. Altogether the branch constitutes a network of interconnected nodes.

"Maps of the minds" which includes mainly Concepts Maps and Mind Maps try to graphically illustrate the mental and linguistic processes of the mind.

Mind Mapping is inter/multi/cross disciplinary and multi-purpose ; it is able to organize, facilitate, mediate, plan, study, note taking outline, brainstorm, decide, support speech, summarize, list, stimulate creativity, discover unexpected relationship, tell story, self analyze, download thoughts, events.... This privilege might result in the responsibility, to use smartly and update the technology released in August 2004.

Since Mind mapping is not "*une mode qui passe*"³ but a serious dynamic learning and self awareness tool, interactive graphics tools associated to Mind Mapping or which supports it will increase the human cognitive power by exploiting the perceptual power of visual material into concise meaning. The spatial layout of the data set elements and visual encoding associated information with perceptual channels such as color, size, shape and rotation have to be decided. Can we play with the semantics of

¹ <http://www.petillant.com/article166.html>, the first French website on Mind Maps known in French as '*cartes heuristiques*'

² Christoph Rissner, March 3, 2003, Seminar work Mind Maps, in http://courses.iicm.edu/~hkrott/site/docs/seminar/sem2002_mindmaps.pdf

³ In French, temporary fashion

the surrounding world, where geometric signs can be examined by connecting, panning, zooming, rotating and even the sound rigid motion ?

This paper has three objectives: to criticize the state of the art Mind Map software, propose and encourage 3D Mind Mapping development and suggest features which already exist in various visualization software.

I shall show that thanks to the various people who are interested in the use of the existing technology we can be enthusiastic and at the same time frustrated by the state of the art Mind Mapping software.

Since the beginning the following has to be specified. If the presented ideas are not conform to the original Mind Map concepts, or too far from the original idea, they should not be called Mind Maps. It is something else, maybe '3D Animated Knowledge Management Map software's'.

I should like my paper to be read by Buzan, Mind Mappers, Mind Map software developers, 3D Graphic visualization researchers, *Entrepreneurship*, potential enthusiastic people who share some of my impressions, and look for a start-up creative idea and even future contributors. This paper will certainly be a lost branch of a Multi-Mind Map if it is impossible to get a critical mass of persons to promote 3D Mind Mapping package and prepared to gather their forces, knowledge and resources. I consider Mind Map as a communicative⁴ tool.

Mind Maps Software:

This paper results from a few mixed feelings: frustration and deep disappointment for the 24 software⁵ (Free trial of all kinds) I found and studied. I have also been very happy to use the new technologies able to easily supplement the existing software. I also truly love Technology and Hyper-realism art. I am sometimes invaded by too

⁴ One of my basic assumptions is that Mind Mapping is a communicative tool where the gap between the viewer/reader and the Mind Mapper is as small as possible. . It might be interesting to measure the people capacity to read/understand a Mind Map except Mind Mapper

⁵ There is an urgent need for an independent comparative study in a table which presents the result of all the existing functions with their main advantages and drawbacks. I shall mention pure Mind Map software such as : ConceptDraw, MindMan, Axon Idea Procesor, mapitsoftware, Inspiration, PMM, Mindjet, VisualMind, Mindmapper, ideafisher, ygenius, Mapyourmind, Mind Finder, Smartdraw, Visimap-InfoMap, NovaMind, Mayomi, FreeMind, Headcase, 3MRT, EminecMymap, SoftNeuron, and not truly Mind Map software but with something from Mind Map software, or linked to Knowledge Management, Decision Process useful, Decision Explorer from Banxia, Visio, Thinkgraph, thebrain. The names of the companies and products mentioned herein are trademarks or registered trademarks.

many 'post-it' in front of my desk. I ask myself: “what would God think about Mind Mapping and Mind Mapping software?” Have you ever seen the latest video games? Convincing people to use Mind Mapping software is easier than to persuade them to introduce a new dimension.

Some arguments in favor of Mind Maps software are mentioned below. The possible automation of the Map creation process is included, as well as the edition of a hand-drawn Mind Map; and if I change my mind I must draw again the whole map (or eliminate ugly marks). Mind Maps expansion and dynamics are usual without efforts with the software.

Usually, I am convinced that the next generation of 3D Mind Map software will seriously question the existing MM software and cause their disappearance. Moreover, if Mind Mapping deals seriously with Knowledge Management and Information Technology the concept might directly affect the international 'old' linear Windows software used everyday by 99% of us. Our desktops and 3DMindMap management file software are more user friendly, useful and aesthetic. How many times do we face the 'findability' problem, even when we struggle so hard against entropy, and strive to keep the structure, with mnemotechnic tips. In addition to the existing special software some creative ways are already found to extend the screen such as the mouse used to travel from one computer screen to another computer nearby thus enabling the user to use 3 screens at the same time: one in front and two others on the left and right at 45 degrees.

The advantages of 3D vs 2D

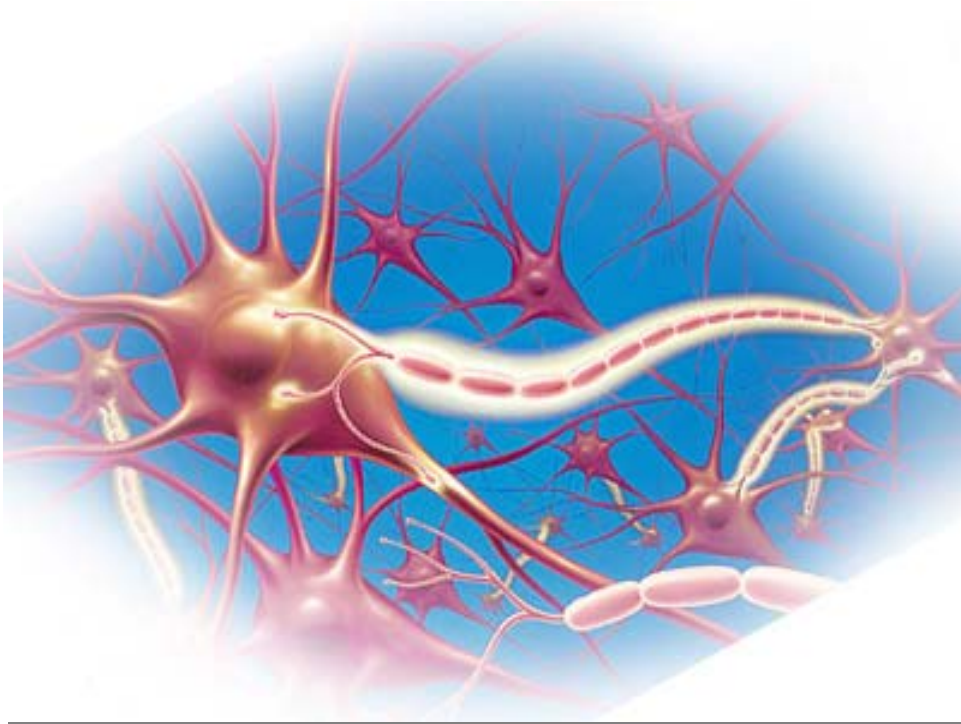
First of all what does 3D mean and what are its advantages?

New vectors are introduced in space and plans when a flat shape becomes a volume.

Mathematically it appears that if N points are set on a 2D plan, the maximum number of connections without crossing is $3 \times (N-2)$. But in 3D, the number of connections increases linearly in N in 2D, but quadratically in N in 3D.

Mind Mapping uses our innate abilities for pattern recognition but not the spatial reasoning, if our vision was totally used. We do not use all our pre-attentive parallel processing power of visual perception and even according to Buzan, Visual/spatial Intelligence is the ability to associate the concepts also in the three dimensional space. Neurons are generally represented as follows and more closely they look like Millions of connected 3D Mind Maps (Fig 1).

Fig 1:

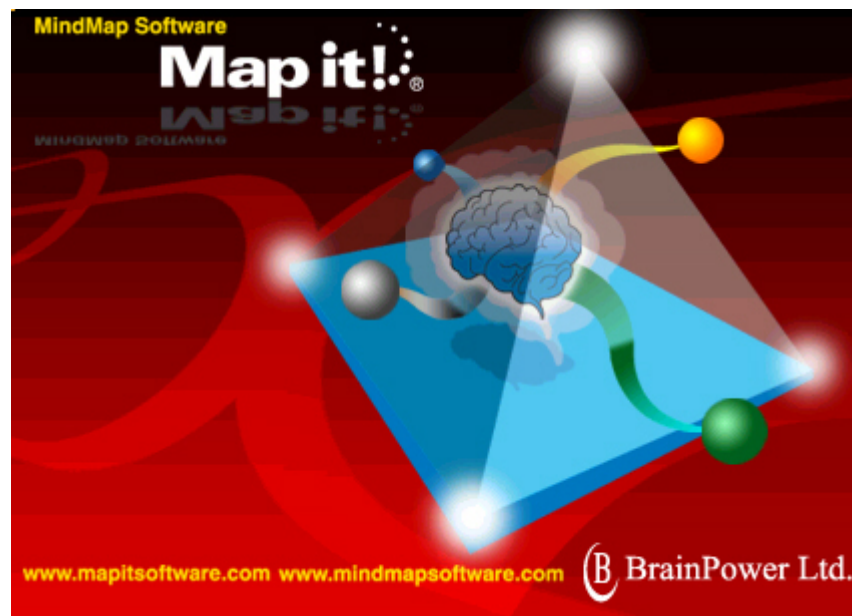


The world is three-dimensional (3D), on the other hand possibly due to the fact that doing the same things in the virtual world that we do in the real world maybe doesn't give more added value to our insight and others metaphors have to be used. For thousands of year we have lived without computers nor software and the unique added value has to be meaningful enough to justify 3D Mind Mapping *raison d'être* .

With a 3D MM software, I can imagine that I am arranging things in a room where they are hanging wherever I want and build a 3D MM alive mind mapping. This could be funny and pleasant experience. Similarly, each thing which symbolizes an idea would be connected with the optical tiny lines of different colors usually seen in movies when burglars are operating in a Bank. I have been influenced and inspired also by *Matrix*, *Special Report* with Tom Cruise, .

I used and tried many MM software and my thought were not inspired by **their technology**, I never felt the 'wow' effect oft technology. I feel that it is a little bit ironic, and even misleading, if not absurd that the symbol/signs/logos used by many software are 3D. For instance in *mapitsoftware* (Fig 2): as follows:

Fig 2:



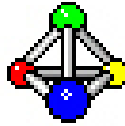
I would like my 3D software to build such maps.

in *Concept Draw* (Fig 3) as follows :

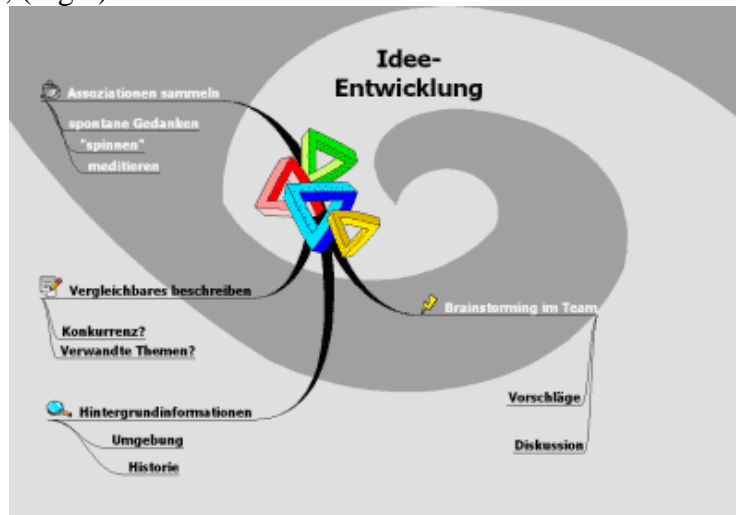


Fig 3:

BrainMine Standard (Fig 4): as follows:



In Databecker, (Fig 5):

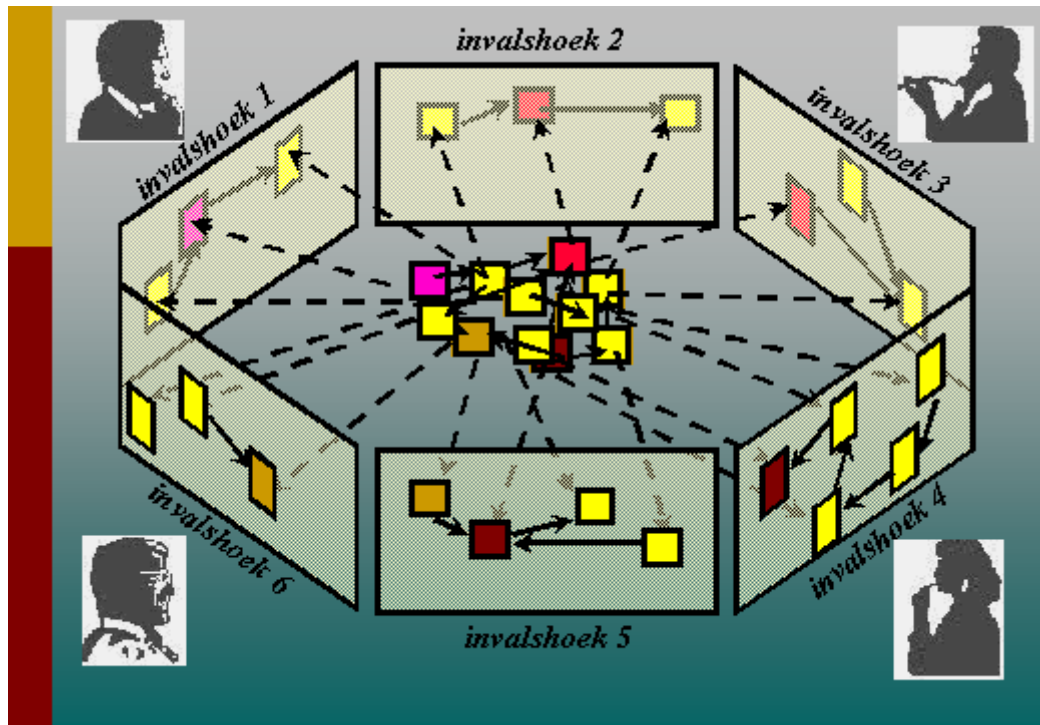


Is it a coincidence? How could it be interpreted? I prefer to forget all about it, as this is not only more aesthetic. The aesthetic aspect is secondary. It is more like a way to foresee the future of Mind Mapping software.

When I started the Research on Internet related to 3D Mind Mapping I found only one 3D beautiful Mind Map hand written by Mark Brown (Fig 5). Apart this Mind Map

A hand-drawn mind map by Mark Brown. The central node is a 3D box labeled "SHAPES". Branches include: "LIGHT FAR" and "SHADING" (with "NEAR DARK" and a gradient bar); "ALPHABET" (with "A-Z" and "0-9") and "CENTRAL HEADINGS"; "TEXTURES" (with "DOTS" and "COLOUR" and a rainbow); "PLEASING" (with a smiley face) and "DISPLEASING" (with a frowny face); "WORDS" (with "IF POSSIBLE" and a red X) and "SYMBOLS" (with "C.G." and a spiral); and "CREATIVITY" (with a smiley face), "WHY" (with "IMPACT", "CLARITY", and "MEMORY" and an exclamation mark).

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Dynamics Diagram⁶ Inc is one of the prominent companies which deal with web site map and navigation tool design. One of the graphic styles used is site mapping in a perspective view, with associated individual web pages, something like a card index. A good example is shown below: a Britannica Online map.

⁶ www.dynamicdiagrams.com which uses www.touchgraph.com technology

From my point of view, thanks to interdisciplinarity and transdisciplinarity, a cooperative-complementary team of experts can always be constituted, one for every specialty in order to use the knowledge acquired in many different fields such as: Mind Mapping conceptualization, Computational 3D graphic visualization, specialist in psycho-cognition, depthography, Mind Mapping, linguistics, Knowledge Management, algorithm, pro-alpha and beta testing, Information architecture... Obviously, conducting the orchestration of such cooperation is an extremely difficult task which requires institutionalization, leadership, commitment, ability to work in *motus operandi*, deep conviction; and the talent required is a common challenge to many interdisciplinary fields.

For instance, I suppose that a good communication between 3D experts and Mind Mappers would give complicated and direct answers to simple questions which are still to be asked: based on what already exists, what are the best graphic visualization software or normal software able to assist the development of a 3D Mind Map software?

As far as I know, AutoCad, Maya, Flash, Mathematica, H3viewer, Amorphium 3 are the bases, but I am a newcomer in that discipline.

If only five three dimensional and animation features could be added what would they be and why?

The essence of Mind map may be gathered in a "big picture" – **based on its own concept** - while building a dynamic, 3D animated puzzle made of components coming from various disciplines and technologies.

The study of 3D graphics perspective law may participate in developing 3D full potential. Moreover, I believe that in general the value often added by the skilled Mind Mappers artists (including 3D) is most often higher than those who have no artistic talent. To better understand 3D space, *Geomag*, is also useful to better understand 3D Mind Map laws. I never heard about a human dynamic Mind Map of persons who personify the symbols and concepts used to convey ideas. It might be linked to choreography .

Which 3D shapes can be used?

What are the 3D basic forms which can be used in 3D Mind Mapping? The answer is not easy: Cube, Pyramid, Diamond, Cone, Icosahedron... Once I have discovered a spread cone which used Schlosberg's conic diagram and a small static cone to present

Plutchik's model of emotions (Fig 6) . One of the first observed evidence showed, that 3D was more efficient than 2D since 3D is able to convey more information.

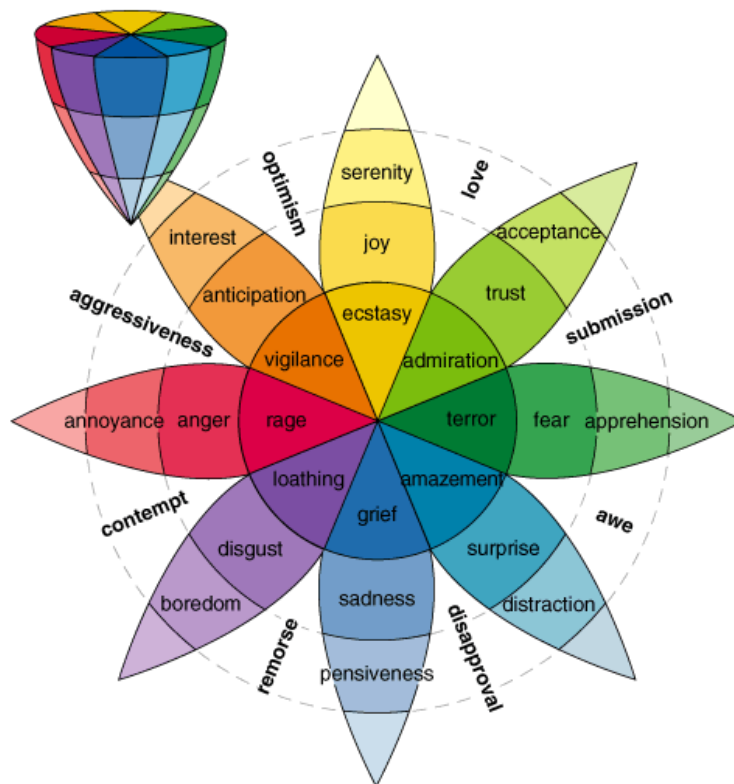
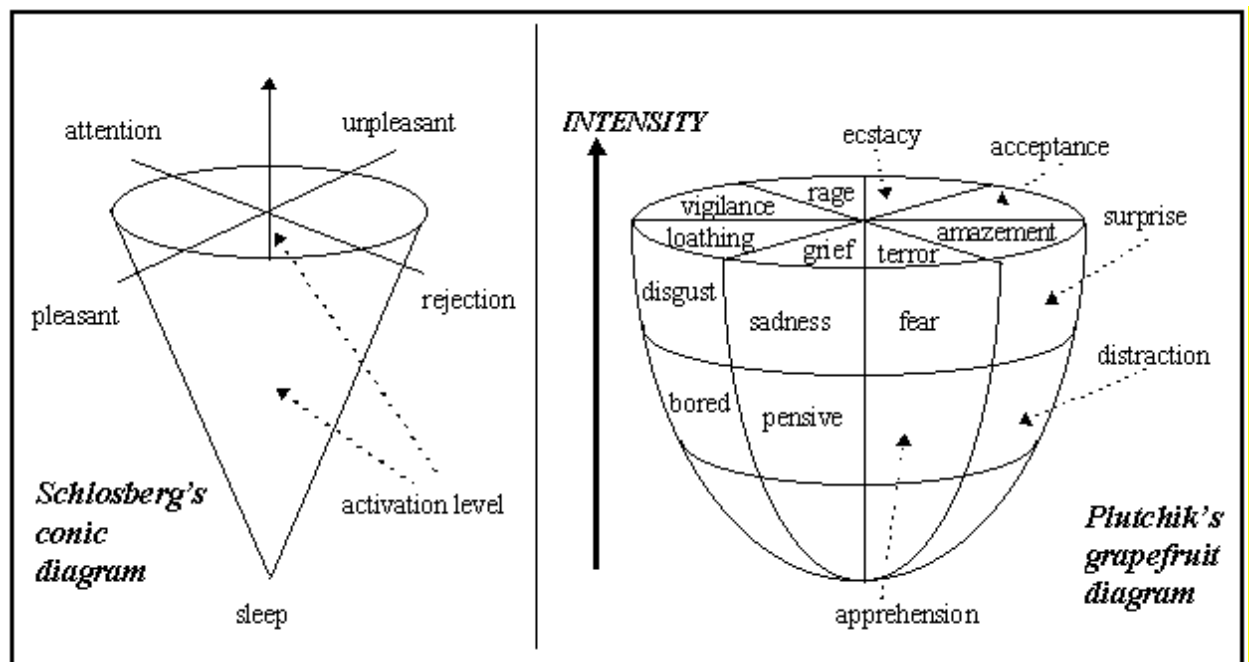


Fig 6:

This can be illustrated by this metaphor/example which shows that 3D can convey more information than a Mind Map which includes the same information. The intensity and level of activation are incorporated in 3D and not in another branch.

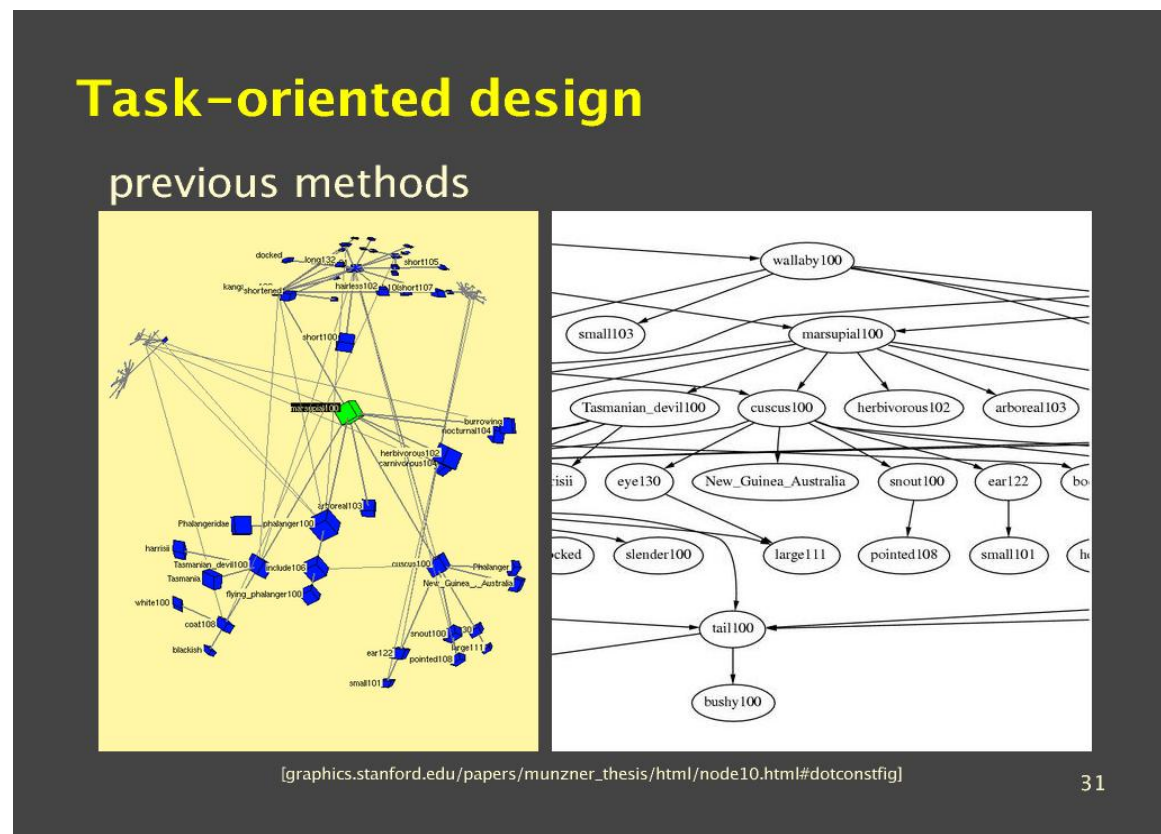


This is only the second stage (from 2D to 3D), let's imagine a third stage which introduces a transparent function within the cone and presents various plans and also rotates around the smallest point -hyper-linking. An efficient graphic visualization tool is obtained, may be really too far from Mind Map. A creative technique which uses 3D to communicate can also be imagined. For example let us imagine a Russian *Babouchka*, one inside the other as a 3D creative utilization . The metaphor is the same as that of the peeled onion to create and share a common and deep understanding.

When starting to contemplate the use of 3D forms for Mind Mapping, intuitively, some 3D forms with angles are privileged instead of curved and spherical forms. That is the reason why I thought the creation of faces and perspectives will result in a range of colors and surfaces on which we can write. This being exposed, contrary to my first intuition, I discovered the graphic visualization of bowls or complicated shapes, with curved lines. I revised my first judgment and studied the Tamara Munzner' thesis, one of the leading specialist who utilizes three-dimensional hyperbolic spaces⁸ which use a software developed by the University of Minnesota . *Geomview* presently exists for Unix only and not for Windows. H3 three-dimensional hyperbolic space viewer s software can be safely used by 3S Mind Map to start building a reliable three-dimensional Mind Map software. A viewer can also be downloaded for Windows. The following is a comparison (Fig 7) which explains the development of alternatives to radial view.

⁸ For a comprehensive explanation of the nature of the hyperbolic space, refer to <http://www.geom.uiuc.edu/docs/research/webviz/webviz/node2.html>

Fig 7:



With these shapes the two key properties of the hyperbolic space can be used: **exponential room** and **outsider's view**. The surface of a sphere or the circumference of a circle grows more exponentially than geometrically since its radius increases in the hyperbolic space, due to the non-Euclidean distance metrics. These two suitable properties have also been exploited in the two dimensional hyperbolic tree browser developed in the pioneer research program: *Xerox PARC* (Fig 8) and applied by *Inxight* or *Walrus*⁹ a Java based 3D hyperbolic viewer. With such a tool it is possible to view the periphery surrounding the key word¹⁰

As far as I know this concept does not exist in Mind Map software

From my point of view, the density of the present Mind Map software is very low, despite the fact that some functions like hyper linking, Multi-Maps, or printing functions try to remedy these drawbacks.

Fig 8: Cone Tree

⁹ <http://www.caida.org/tools/visualization/walrus/>

¹⁰ Drawing Large Graphs with H3Viewer and Site Manager, Lecture Notes in computer Science series GD' 98: Symposium on graph Drawing, Montreal Canada, August 98, www.graphics.stanford.edu/~munzner

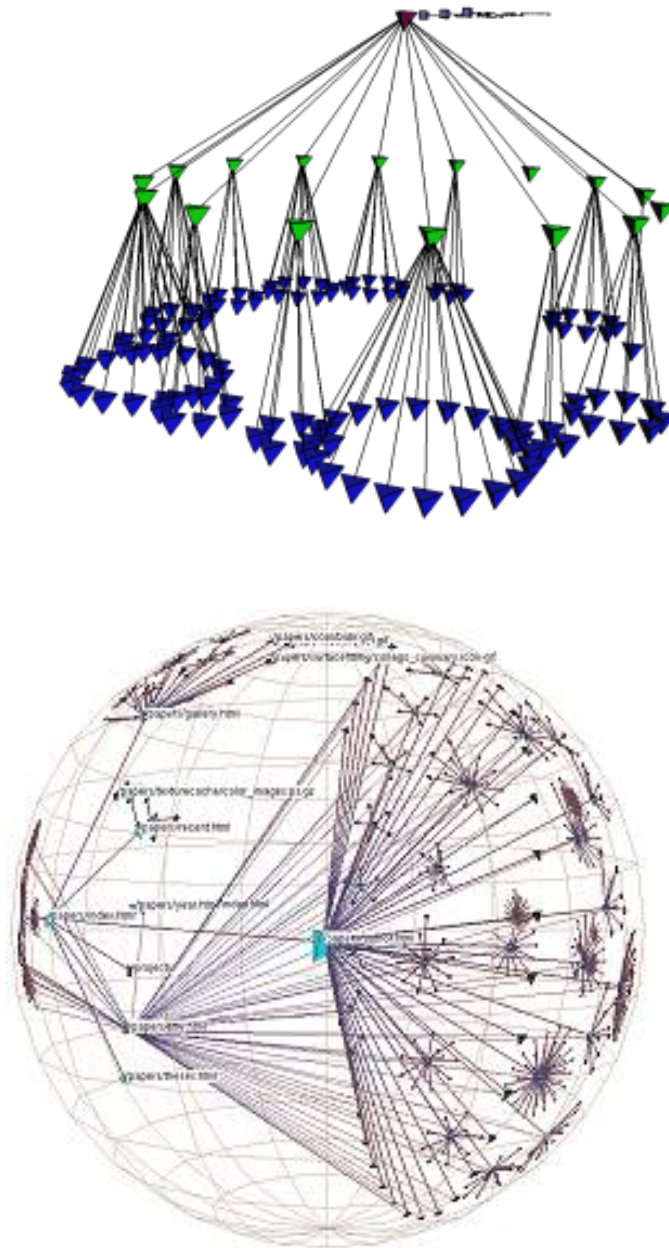


Fig 9: Hyperbolic 3D space for Internet (can be useful for huge Mind Map or management of Multi-Maps)

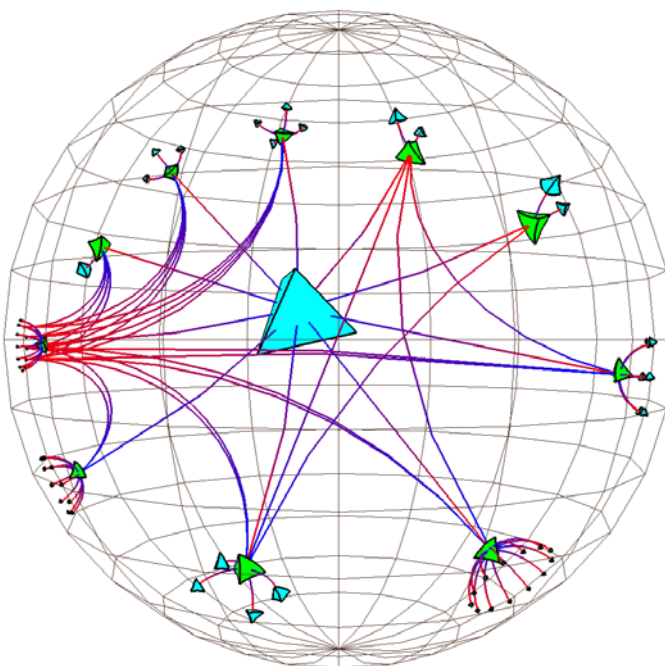


Figure 10 illustrates the use of Hyperbolic 3D space. This basic structure would be one of the first structure to be examined, criticized and adapted to 3D concept of Mind Map. In general, Cone tree or Internet cybergeography deal with gigantic dimensions and much more information than Common Mind Map. However the tool can also be used on a smaller scale for usual Mind Map.

I read Isabel F. Cruz and Roberto Tamassia tutorial paper and graph drawing, and I knew that knowledge and dynamic visual grammar exist and have been developed. This information is available only needs to be picked up for 3D MM software¹¹. A comprehensive theory can be used to build 3D shape grammar¹² and serve 3D Mind Mapping.

After a more thorough research I discovered a software called *Amira*¹³ (Fig 10) specialized in 3D graphic visualization of various areas and molecules. Some illustrations are presented and show that Technology really exists but is not applied to Mind Maps.

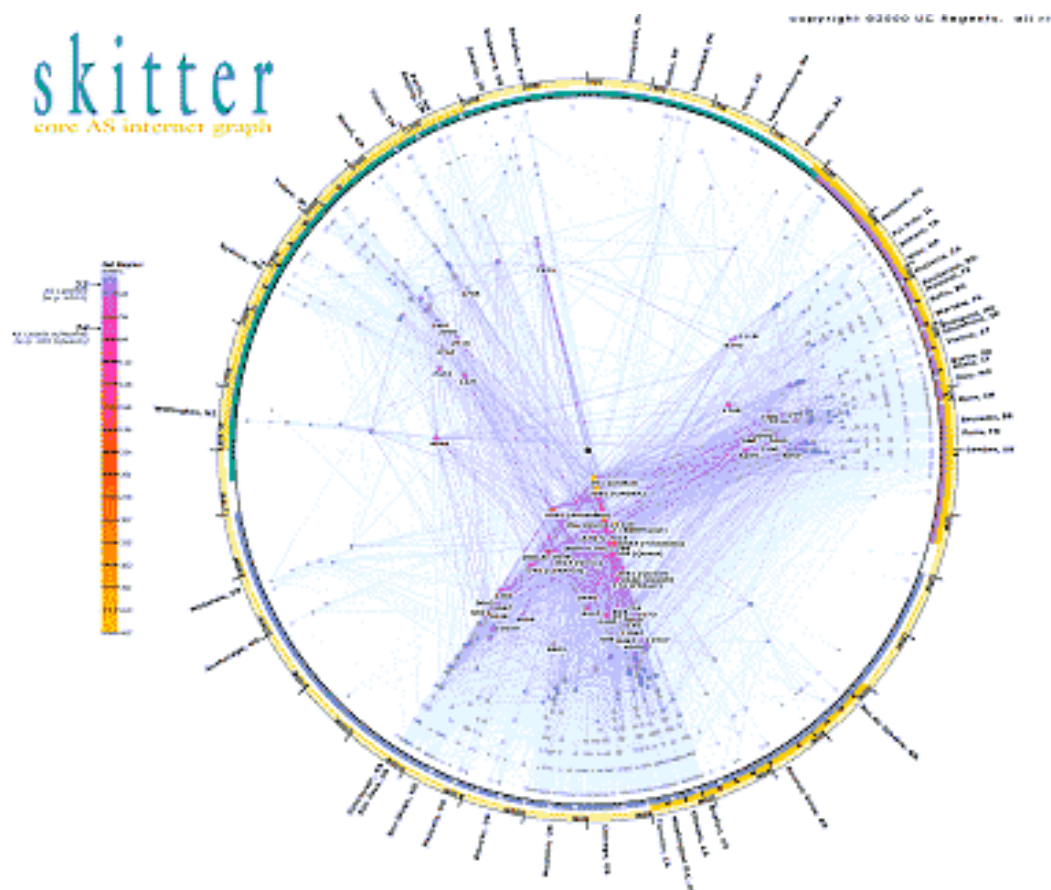
¹¹ <http://www.cs.brown.edu/people/rt/papers/gd-tutorial/gd-constraints.pdf>, Tutorial on Graph Drawing. by Isabel F. Cruz and Roberto Tamassia

¹² See e.g. **Introduction to 3D shape grammars**, D. Nadeau, in www.sdsc.edu/DOCT/publications/a6/intro_3d.htm

¹³ www.amiravis.com

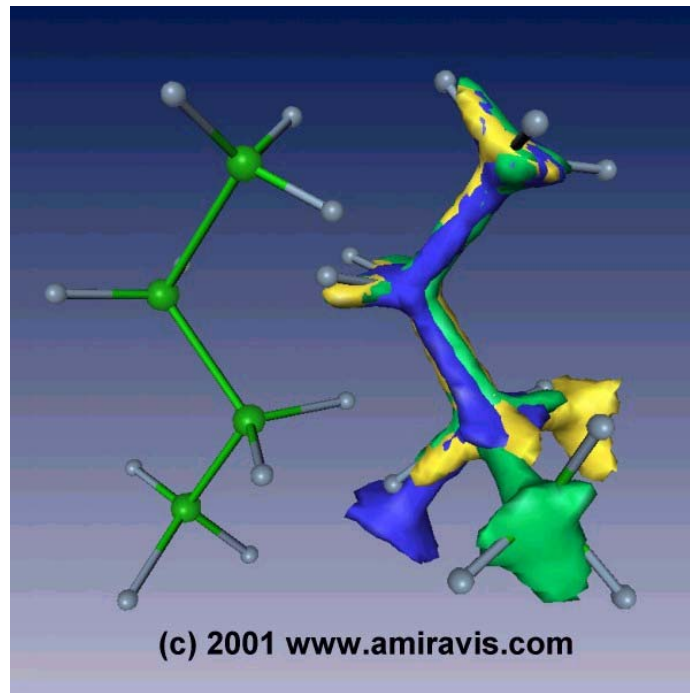
Some good news could be shared with all the skeptical scientists. 3D application to Mind Map is much simpler than the challenge to be taken up by another domain such as cybergeography¹⁴ (Fig 11) due to its relative "simplicity".

Fig 11:



I believe that molecular 3D views might be useful to widen current Mind Map. It uses the effect of far and close objects, and due to its range of textures and colours, it makes possible the use of the connection as a communicative tool of information.

¹⁴ www.cybergeography.org/atlas/info_spaces.html



3D Mind Map Limits

I suppose that all the more the concepts are abstract, all the more they will require a great number of words in the Mind map and use boxes instead of symbols or icons. This is true unless a strict universal, complicated symbol coding and their meaning are created. If key words are Mind map central part, it is essential to look for a software specialized in 3D writing such as *Ulead*.

*Thesaurus*¹⁵ uses *Thinkmap* for a simple implementation of the word connections without 3D, A single word appears in the center of a spider configuration including words related to and rotating around the central word.

It is recognizes that key words concept is essential to Mind Map. From my point of view, this concept simultaneously incorporates Mind Mapping main advantages and drawbacks. An entire world is hidden behind Mind Map, a world of experience, with huge Databases and unshared emotions

In fact, I imagine that 3D Mind map is the result of a transparent, on-going creative inner speech where people ask themselves again and again the following facilitative question: "If this key word was broken into three words which one could be used?" . Why three words instead of 1000, this is arbitrary. A complete dynamic and extensive map of knowledge and research could be built to communicate more efficiently.

¹⁵ <http://thesaurus.plumbdesign.com/index.jsp>

Why 3D? The added values of 3D in Mind Mapping:

For a while, we support one of Buzan's Principle: "All aspects of a Mind Map should be visible at all times". My rhetorical question will be the following: Can all the room be seen at the same time without losing the sense of the processed information. I think so. If I look at various details, or direct my eyeballs towards a single direction. Again, the answer is yes. Technology must be a tool and not a constraint. A technology suited to our needs should be created and the concept redefined, despite the limits of a technology **If we disagree** with Buzan's principle which states that: "All the aspects of a mind map should be visible at the same time". When I unroll (some software use expand and collapse function) any secondary branch, all the Mind Map is hidden. For instance: in note taking or creative process modes, the focus is nearly always one thought at the same time, not all of them at the same time. When I am looking at a Panorama, my eyes move slowly and my neck moves from Right to Left or from Left to Right and everything is 'visible' ; the metaphor has obviously its own limits. Having said that simple feature such as Scalability: "Fit visible" in *Acrobat Reader* is critical to keep readable the Mind Map even it is big,

I look at the MM which shows Mind Mapping laws. Let's review one by one to see where 3D is problematic or in collision/contrary to the existing laws

1. Structure (reflect, association, radiant, clear)
2. Colour (use, link Code)
3. Images (codes, symbols, through out, central, beauty, 3D)
4. Words (key, print, size)
5. Lines (central, connected, organic, length)
6. Paper (landscape, blank, start centre)

I think that all 3D MM can meet these 6 principles. Even more, I wish to challenge another holy principle 'the rule of Eight branches' (There is even software which automatically pop ups an Eight rule branch warning). Does it count if you put think in perspective, use a fish-eye view, use 3D or do we also get the same rules, saturation or you get an option to see out of the box?

I believe that 3D introduces the same key-flow of contoured branch, or curved hand writing to break the straight line rigidity. If there are really as many connections in

the brain as atoms in the universe, it is somewhat inappropriate and/or illogical to retain in an eight branches on a A3 paper, some information which does not translate what we deeply believe, cannot transmit our knowledge, and give the perspective express of our constantly changing and restructured thoughts. Astrophysics studies seems much better suited¹⁶.

A 3D mind map enable me to more easily navigate into a Multi Mind-map, while keeping ""everything visible and getting closer to the actual branch I should say planet I am developing. When the present software is used to work with multimaps, we don't **visually** know where we are, I also suggest to use 3D like 3D tree to see the Multi-maps and keep clear the navigation from one Mind to the other.

Above all I believe that 3D keeps respectful of radiant thinking and move the concept one step forward. For example a connection can be added in all Mind Software between the branches called 'Mental connection' in some software ; but in 2D when the presentation of many connections, very quickly result of the line crossing problem.

It might be even useful to learn a bit of astrophysics, topology, and depthography to better understand the space management. The spatial relationships show the intricate interconnection of the concepts. If 6 planets with their own satellites are surrounding a core (my firts key word)

Indeed in almost all the software or the function of hyper-linking and Multi-maps management are either absent or very weak when it could be a basic feature. Hyper-Linking between the Maps is only another node with a branch. In a 3D mind map, a 3D concept can even be used say a concrete concept, rich in symbol such as a body, a house and restructure the space according to our needs and encapsulate a message. 3D Syneptics- which means- insights by analogy and metaphor can be included.

Indeed moving holograms of ideas and changing the point of view to discover new perspectives is critical or even understand the structure of our own misconceptions. The holograms are useful since they have the transparency needed for the next generation of 3D mind mapping software with or without gloves. We can even go one step further. If you say the word, it appears under the form of a hologram idea and you move everything with your hands in a virtual space you are building. If you laughed just now, it is just perfect for me make a visit to:

¹⁶ Solar System Visualizer, <http://www.geom.uiuc.edu/software/orrery/>

<http://www.linc.org/voicesw.html> for the aspect of recognition voice software or the software Express Scribe¹⁷, add to this the survey of different hologram software you can find at <http://www.lenticular.biz> or the work of www.stereographics.com.

With 3D shapes I can express idea **without saying**: "This is the foundation", "This is the core", "This the underground", "This is far", "This is close", "This is primordial", "This is a key player", "it's a pillar", "this is in the background" ...

Some options are transdimensional- no matter if you speak about a 2D Mind Map or a 3D Mind Map and they can be easily added-. As far as I know they do not exist in none of the Mind Maps software and can be use for 2D or 3D Mind Map. It is impossible to save the history (histograms) and the creation process of the Mind Map to see the evolution of the Mind Map/Thinking process with their chronology. That's existing in Chat forum or educational context when it is meaningful to see the expansion of the thinking and its rhythm and path. In the same spirit - as far as I learn in none of the 30 software- there is no function "compare Maps" similar to "compare document' Word, with the possibility to accept or refuse change one by one or to justify changes all at the same time. Transparent juxtapositions functions (that exists in 3Dsoftwares) would allow to analyze similarities and differences between Maps, to fuse them, to expand them.

I suppose 3D Mind Mapping will make the analysis of the concept centrality easier - key words like key players in words of Social Network topology. In fact in a Mind Map, a key concept as in Network is not necessarily the concept with the most connections, a concept can be 'central' because of its connectivity and geometric characterization. I am convinced the centrality measurements of Bonacich could be implemented to the future 3D mind mapping. By the way, Zenou claimed that software like *Mathematica*¹⁸, includes the necessary mathematics tools for the building of the software I am dreaming about because this software relates to the field of synthetics mathematics for the implementation of graph theory¹⁹.

3D Mind Mapping will challenge the scalability of huge Multi-maps in which notes can be entered and various formats of documents attached formats, links to web site, know where you are at any moment or use automatic detection of data relationship.

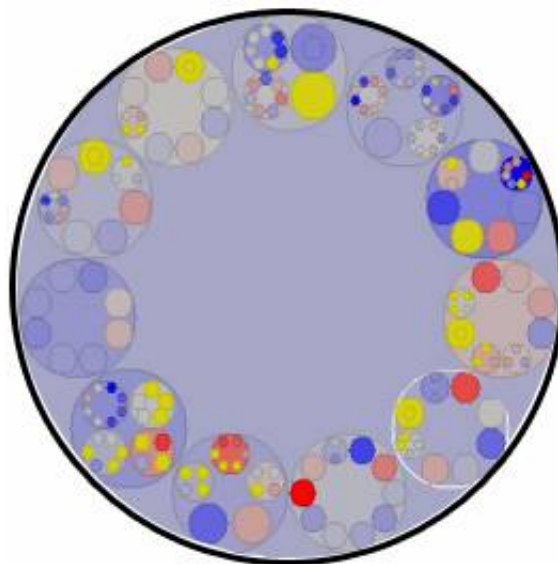
¹⁷ <http://www.nch.com.au/scribe/index.html>

¹⁸ www.wolfram.com

¹⁹ A special thanks to Yves Zenou who specialized in Social Network and gave this new insights while presenting alternative measures to Bonacich's concept to analyze the concept of key player, see for example **Who's who in crime networks wanted: The key player**, C.Ballaster, A. Calvo-Armingo, Y. Zenou, July 2004.

From my point of view, Mind Map is Dialogic or can be dialogic versus non-communicative because of its free flow and free infinite expansion. Some of problem of the Dialogue are the absent of depth, patience, humility to build common understanding while peeling the onion enough time till the point that we expose/share the core essence of our Cognitive, Emotive, experiential, Value based, Personality Database and say more about what do we know and understand and from where?. It seems to be that the spreading process in the Mind map illustrates that. Technology can be helpful right here. Another issue is that in lost in the energy of Dialogue we get to a sub-sub-sub branch without being able to reload the path and its structure. Good 3D MM will resolve the 'findability' problem. There are many interesting way to deal with the findability problem such as the fractal edge²⁰. Fractal edge view can be introduced to manage also Mind Maps files.

Fig: Fractal edge

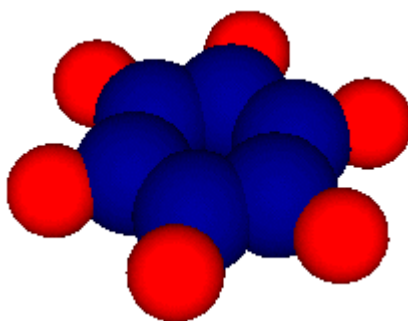


Fractal edge is a real challenge because metaforms - data making sense of other data- are conveying information; these metaforms will prosper at the threshold points whether these signals degenerate into sounds exploiting another sense. As far as I learnt, none Mind Maps software use our ears and sound (except gong after Brainstorming session).

²⁰ For other interesting try to resolve findability problem, the fractal view is challenging:
www.fractaledge.com

In some software and some thinking mode, there is meaning and utility to see exactly the same information from a different angle, to focus the perspective, a kind of some for one branch – its mother and sons. The corollary to the expression of flexibility is the discovery of related information that comes from following the connections between items. For example in genealogy (*Family tree maker* software, you can require to see the whole tree from the perspective of the Grand Father of your cousin or from your own perspective, this is the same information but presented from a different point of view and it is really useful. In some social Networking such as the *Huminity* software, I can see what is the connection (simple or complex) between few people. Who is the linking person between two people?

I am almost sure that all the MM software builders considered the idea of 3D, and those who answered my mails like Elliott Bignell said it clearly and didn't argue with the potential or added value of it but rather mentioned the implications in development such as time, or resources needed. It was sometimes tried in pre-versions of the software itself. For example in Head case: here is one result: *Benzene Headcase*



Let's be creative, here are the features that I would introduce with the one Million Dollar budget tool:

- Automatic Conversion of 2D mind map to 3D mind maps.
- Rotational 3D function: 3 rotational tools that constrain object rotation to x, y or z axis.
- A large library of 3D text.
- Cameras - X number of independent cameras, animate focal length, scale and position, hand and face cameras, X number 3 pre-set camera types in order to perceive the same information from different angle.
- A full screen mode.

- An atomic perspective. From the core to the outside . Of course, when we are mind mapping only few concepts of different branches are connected.
- Animation in 3D hyperbolic space²¹.
- Pre-program animation: a flower is blooming, "carousel" seems to me very useful with 3D Mind Map which uses cone tree view or hyperbolic space.
- Excellent transparency functions in order to don't transform 3D as a drawback.
- Interoperability which means that the Mind Map is compatible and permit the insertion of documents or objects which comes from different applications.
- The First concept map international conference which took place in September 2004 in Spain²² . Without being disrespectful of the autonomy and uniqueness of Mind Maps, it seems to me worthwhile to tune differences and commonalities between the two. I wish to use the opportunity to mention that each year there are very serious symposium on Information Visualization even with contest to increase the competition among academics teams and between software²³ in none of the graphic visualization Symposium I read about Mind Map software. Even More, there is a wide academic impact of Concepts maps, I have hardly found scientific papers about Mind Maps²⁴. For example, the GVU (Graphic Visualization and Usability Center in Atlanta) center who has a Software Visualizations department²⁵ or The Graphic visualization project²⁶ might be concrete resources for cooperation and research.

After my research, I claim that to adapt 3D technology towards MM is already feasible and worthwhile by using existing 3D technology and building with it Mind Maps. Even more, most of researches related to 3D technology faces models thousands time more complicate than 3D Mind Maps may need.

The problem is that all these technologies have to be adapted in their functions, purpose to be friendly-usable to mind-mappers purpose and 3D Mind Map laws still to be born. If these laws already exist, I apologize I did not find it. Why should be

²¹ <http://www.geom.uiuc.edu/docs/research/webviz/mpegs/seq.mpeg>

²² <http://cmc.ihmc.us/>

²³ See for example 2003 Symposium in Seattle.

²⁴ My impression is shared and explained by Volker Rautenberg who compared Mind Maps and Concept Maps in www.philomind.de/doc/philomind-308.htm

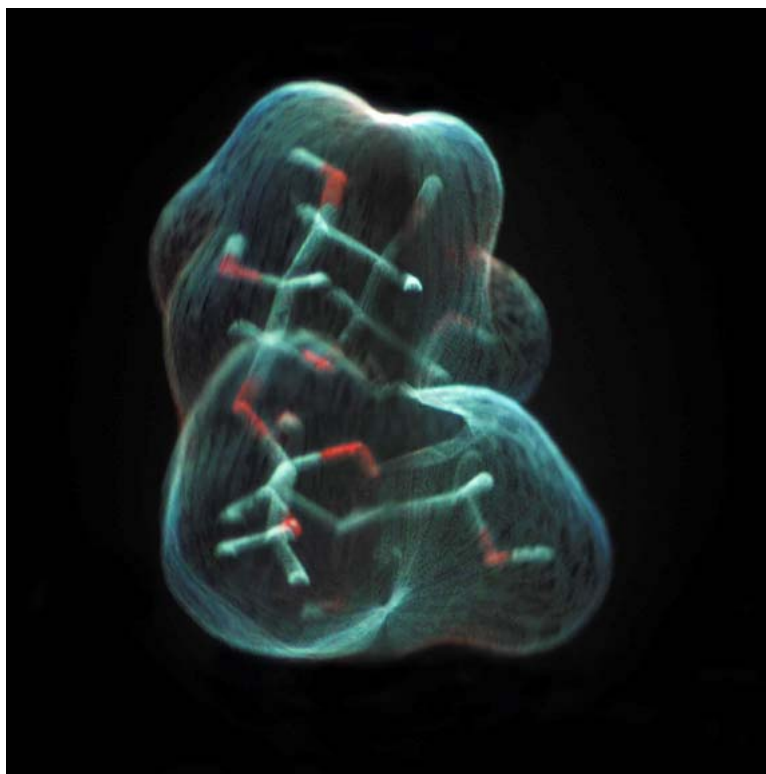
²⁵ www.cc.gatech.edu/gvu/softviz

²⁶ <http://www.research.att.com/sw/tools/graphviz/>

assume that 2D Mind Maps and 3D mind maps obeys the same law, maybe yes maybe no let's check it first with the implementation of current 2D mind maps law and check it for 3D MM. I even suggest to learn from basic laws of 3D even from toys such as 'Supermag', 'geomag' for children from 3 years 's old to better understand the mechanics of 3D MM²⁷.

3D technology is certainly highly competitive and can be costly, I wish to mention for example the technology which includes rotating systems are already commercially available for a relatively affordable price of \$45,000, like the system called Perspecta Spatial 3D from actuality²⁸. Here is an example of a sugar molecule with includes, connection, transparency, shadows, textures.

Connections, transparency, shadows and textures are good examples of criteria to for 3D Mind Mapping.



3D Animation in 3D Mind Maps:

According to me animation and 3D are inseparable and complementary concepts

²⁷ <http://www.geomags.com/geomag/secret.pdf>
²⁸ www.actuality-systems.com

Well why could we consider to introduce motion to Mind Mapping? Dragging easily and restructure from one corner to another is not enough, this is only the baby first step. In the 'best' software, we can find the function presentation which permit the gradual presentation of each branch to your own path (very close to Power point feature). Mind maps and animation have been already tried.

To the credit of the leading Mind Maps software it is to say that they have excellent two ways auto-conversion function to Word, Power Point and MS Project, Outlook, but they fail to use graphic software.

One of the problem I face when we read Mind Maps especially from others peoples is where should I begin (except the center), there is no orientation?

Here is a very basic example of animation in Mind mapping introduce for the 12th International conference on Thinking which will take place in Melbourne-Australia²⁹. Sophisticated animation for presentation already exists in PowerPoint, Flash, and many professional Animation software such as 3D Studio MAX, Maya or Lightwave3D, 3Dcad, these tools are the common tool of every first degree Student in an Art, Architecture and Graphic University (I checked at the art's school of *Betsalel* at the Hebrew University of Jerusalem, they learn there mainly Maya software). A Master student who graduated in June 2004 built the software *Mayomi*³⁰ (standing for Map Your Mind not to be confuse with the software *Mapyourmind*) using only the flash software. It is simply incredible to see which kind of animation can be done, for example to use a 'Magnifying glass' function to create a floating image zone and permit an overview image. Ian Vincent, also built an original 14 minutes presentation³¹ with Flash in which we can get a taste of what very basic animated 3D can provide with full simultaneous audio- comments. In his own words speaking about the presentation: " At the time of producing the winterbrain movie clip I became acutely aware of how with a little more complexity, (actually a lot more) I could have made each arm of any antler revolve around its parent in 3D and scale, recolor etc. In addition each of the arms can be rendered to give a 3D appearance. If you look at each of the individual arms, and imagine that a rendering tool had given them a rounded look, so the shapes look more natural. Unfortunately I never had time

²⁹ <http://www.thinkingconference.com/main.html>

³⁰ www.mayomi.com

³¹ from <http://openeeg.sourceforge.net/doc/index.html> ...look for "Winterbrain 2004" 4.8MB.

to do it because it would make it look really cool, and I know it isn't rocket science, just time and effort, both of which are in short supply atm."

In 2D we can rotate by theta round a point, in comparison in 3D, we can rotate about any arbitrary axis, architects use this function as a basic one.

I wish to mention the technology '*Thinkmap*'³² or '*inxight*' already implement some useful Animation, Thinkmap's node-edge display so called spider³³ creates a three-dimensional view that can be rotated to expose more connections. With the thinkmap Spider, it is possible to view and understand the relationships of thousands of nodes, allowing exploration of dense clusters of information. The concept used is "informotion" (a neologism: a mixture of the two words information and Motion) which are modeled on physical properties such as magnetism, elasticity and viscosity. Another freeware so called Huminity a social Networking freeware uses the same technology.

Zooming and scaling maintain the reader's orientation all the time. A serious drawback of existing software is the readability of mini-Mind Maps or even function such as best fits which doesn't make the map readable because of their format even their printability is not practical unless you use a magnifying glass/distortion techniques. The improvement of key- functions that I call: 'maximization use of white, 'empty' space' and redistribution of the space according to the number of branches would automatically rescale the map and improve its readability and printability. Having said that, such 'empty' space is as important as the space filled with information or visuals. It guides the eye, it help the overall layout, not to be overburdening for the viewer and it calms down too crowd displays, and gives generally a feel of professional, elegant and quality work³⁴.

I found also a simple way to check software visibility, before even to pay attention to tuning (graphic of the branch, of the nodes, colors, background, hyper-linking,...). I am simply create immediately around 10 concepts around the main concept and adding to each one a very small number of sub-branch twice to get three levels. Generally, the map becomes quickly messy, without balance or perfectly symmetric in using free space and unreadable even before the insertion of any kind of objects, symbol, legend, notes, title or colors.

³² www.thinkmap.com, www.inxight.com

³³ www.thinkmap.com/images/architecture/01_spider.gif

³⁴ In the excellent website, www.mastermedia.com, **What colors should I use?**, an article of Luigi Canali de Rossi.

Conclusion:

In let's say 2 years from now (this paper has been written in Janaury 2005), when we will answer the two following questions: Firstly, are we any closer now to 3D Mind Mapping package and secondly What did any of us contribute for it? I hope the answer will be a big. 3D animated Yes.

I hope for now that 3D mind mapping worthwhile serious critics, consideration and development. Moreover, I am expecting a fruitful, honest dialogue/cooperation with Mind Mapping software builder, theoreticians and Mind Mappers. I am asking people who disagree and think differently to argue, to enrich the dialogue process around 3D Mind Mapping while bringing sources, counter-examples, revealing their Maps of the Mind on this topic, and answering the question what can be do instead of the actual 'poor' Mind Maps software.

As a conclusion, I sincerely dream of the day when my son will think that 3D Mind Mapping belongs to prehistoric era and I wonder what will be the future new dimensions. An hint to new directions is given by the last development of 3D screen and holograms³⁵ called Hologrammic Mind Map.

³⁵ <http://www.x3d.com/>

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For commodity, all along these lines, I made no difference between Mind maps, Concept Maps, Idea Maps, so I have to apologize to the purists. I believe that each of them enriches the concept of the other and that the positive aspects of 3D will not be appreciated because of dogmatism only.

I wish to sincerely thank first of all my friend Avi Goodstein-Hilbuch for his critics and Professor Bill Jarrard a pupil of Buzan, who both inspired me and invited me to confront my frustration, questions by learning, and also Ilan Tojerow for his encouragements and comments, Armin Schwartzman for his dynamic enthusiasm and systematic comments line after line and Edith Brener for her patience and efforts to keep faithful to my thoughts thanks to her professional editing and translation.