Dynamic Optometry – UK 45.

1. **Abstract.**
2. **Introduction.**
3. **Lecture.**
4. **Dynamic Retinoscopy.**
5. **Summary.**

Abstract.

Dynamic Optometry is a new supplementary vision examination technique, developed for the benefit of patients with binocular anomaly.

Dynamic Optometry can bee used as a supplementary examination technique at the primary examination, to evaluate the presence or lack of binocularity.

Dynamic Optometry can also bee used to check up on the effect of the optical visual aid and of an eventual visual training of binocularity.

The examination in Dynamic Optometry takes place within the central visual field. The patient is standing up and moving from far distance to near distance by using the complex of gross motor, fine motor and ocular motor.

The achievement of Dynamic Optometry must bee compared with the expected standards, or the individual calculated results on distance, visual field and visual space.

NB: Abstracts is English - and Synopsis is Greek for Vision and Eye = Binocularity.

O. Dormann Frandsen
Optometrist.

Introduction.

Mr. Chairman.
Distinguished Guests.

First of all I would very much like to thank you for inviting me as guest lecturer at this summit of Optometry and Visual Science.

Dear colleagues – all.
I have most certainly been looking foreword to seeing you to day, - and to present to you a lecture on Dynamic Optometry – a most interesting subject on how to deal with binocular anomalies in a new approach. We cannot solve them all, we can but do our very best to give a major part of our patients with binocular anomalies a far more comfortable vision.

I can assure you that Dynamic Optometry is a very reasonable visual examination technique, supplementary to what you already know, whether you are an optometrist, patient or companion. Why haven't we seen that before? I simply don't know. But my point of view on dealing with binocular anomalies has been completely changed.

I stumbled quite accidentally on this examination technique in my efforts to avoid aniseiconia when dealing with anisometropia. Considering the acceptable differences in magnification on right and left eye, I found very little or no deviations horizontal on right and left side of the central visual field. But I most certainly found them vertically.

Vertical the central visual field was often low - and sometimes even very low compared to horizontal. Even if right and left side horizontal were almost equal to the Harmon Distance (from elbow to knuckles), the vertical would still be too low. And changes of lens design did not change the shape of the visual field that much.

What I really found was a number of just ordinary binocular anomalies in such as visual acuity, refraction, accommodation, fixation, foria, fusion, stereopsis, vergens, suppressions, lack of SI -LO effect - etc. We know them all. I even found that the level of each function might differ on different distances.

What was then the actual starting point for the examination in Dynamic Optometry, and what was the physiological aspect to pay attention to as the procedure on how to measure the central visual field, - and in which different distances would visual deviations occur.

This was the origin of Dynamic Optometry as supplementary visual examination techniques, developed for the benefit of patients with binocular anomaly.

I shall most certainly do my very best to tell you about the Concept of Dynamic Optometry – and I do hope you will enjoy the lecture.

Ove Dormann Frandsen.

Definition.

Dynamic Optometry is a new supplementary vision examination technique, developed for the benefit of examination and treatment of binocular anomaly.

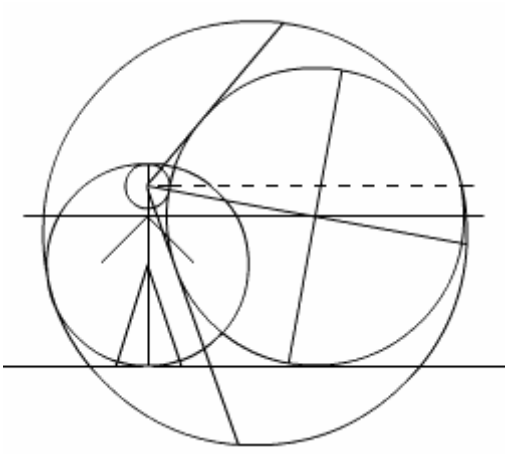
Dynamic Optometry can bee used as a supplementary examination technique at the prime examination, to evaluate the presence or lack of binocularity.

Dynamic Optometry can also bee used to check up on the effect of visual aid and the effect of eventual visual training of binocularity.

The examination in Dynamic Optometry takes place within the central visual field. The patient is standing up and moving from far distance to near distance by using the complex of gross motor, fine motor and ocular motor.

The examination distance I Dynamic Optometry is from standard 600 cm, 460 cm, 320 cm, 160 cm and 42,5 cm., or the expected individual calculated distances from far distance to near distance.

O. Dormann Frandsen
Optometrist



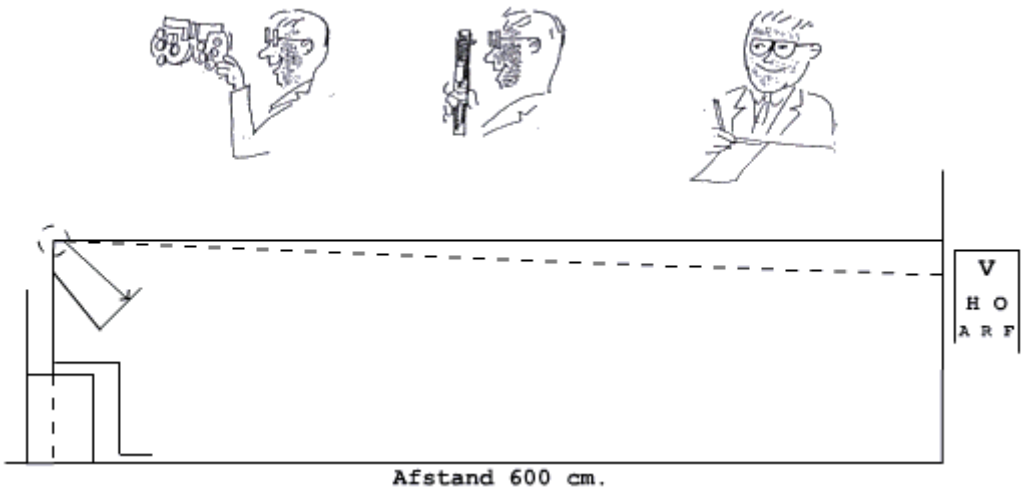
Dynamic Optometry - © - All rights reserved.

Analytical Optometry – Functional Optometry – Dynamic Optometry.

What makes the difference?

Since 1909 the Snellen chart from 1862 has been the international accepted standard chart for visual acuity test at 6 meters. In 1962 the Danish Society of Optometry accepted to approve the Optometric Extension Program standard procedure in Analytical Optometri as 6 meters for visual acuity at far distance and 40 cm for visual acuity at near distance.

Analytical Optometry.
Analytical Optometry or the O.E.P. 21 point analytical is an established standard procedure in the use of a phoroptor, and the optometrist is following a standard method for gathering, assembling, combining and abstracting optometric data at 6 meters and 40 cm. for interpretation and visual diagnoses. This method as standard procedure enables the optometrist to compare the findings from one visual examination with findings in previous or future examinations.

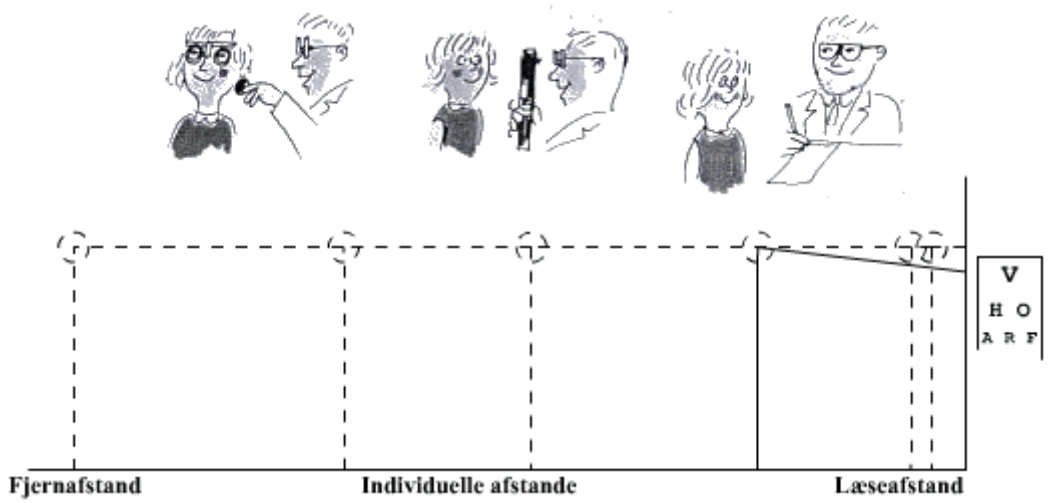


Functional Optometry in standard distance 6 meter.

Functional Optometry.
Functional Optometry is the examination of basic visual functions on standard far distance 6 meters and standard near distance at 40 cm. The optometrist is primarily working with the retinoscope and trial lenses in free space, examining ocular motor, fixation, visual acuity, refractive status, accommodation, convergence, fusion, stereopsis, and all monocular and binocular functions, - and visual screening.

Dynamic Optometry.
Dynamic Optometry is a new supplementary vision examination technique, developed for the benefit of examination and treatment of binocular anomaly. To check up on the effect of any optical visual aid, and check up the effect of any needed visual training on binocularity, - in all distances from standard 600 cm, 460 cm, 320 cm, 160 cm and 42,5 cm., - or in the expected individual calculated distances from far distance to near distance.

Dynamic Optometry–functional standard distances from 600 cm to 42,5 cm.



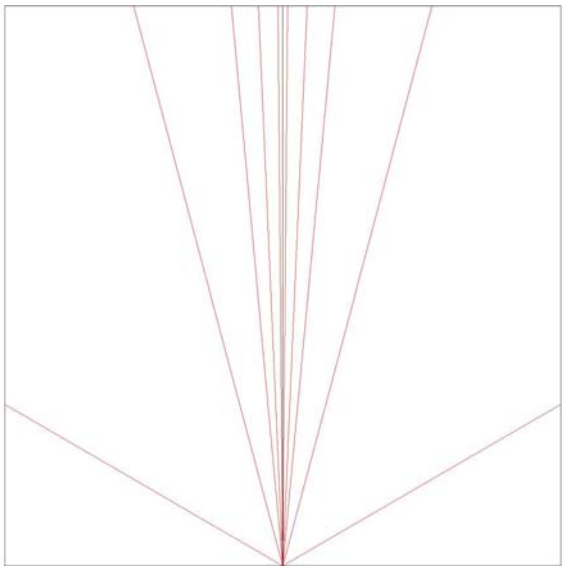
600	460	320	160	42,5	25
FF	PD	SD	BA	FN	PN

Functional standard distances:

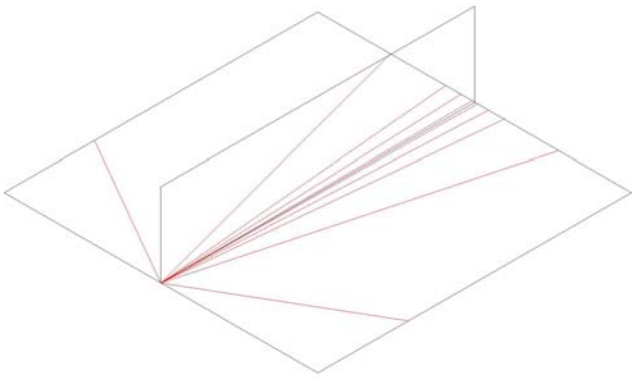
FF:	Functional Far Distance	= Vision at far distance. (6 meter)
PD:	Perceptual Space Diameter	= threshold between far and mean distance.(460)
SD:	Visual Space Diameter	= Vision at mean distance. (320 cm)
BA:	Basic Distance	= Distance for individual starting point. (160 cm)
FN:	Functional Near Distance	= Optimal reading distance. (Harmon) 42,5 cm.)
PN:	Proximal Near Distance	= Shortest reading distance (25 cm)

Binocular Visual Field divided in to following arias:

Binocular visual field - 120 degrees.
Central visual field - 30 degrees.
Central fusion area - 10 degrees.
Macular area - 5 degrees.
Central fusion point -1 degree.



Binocular vision - top view.

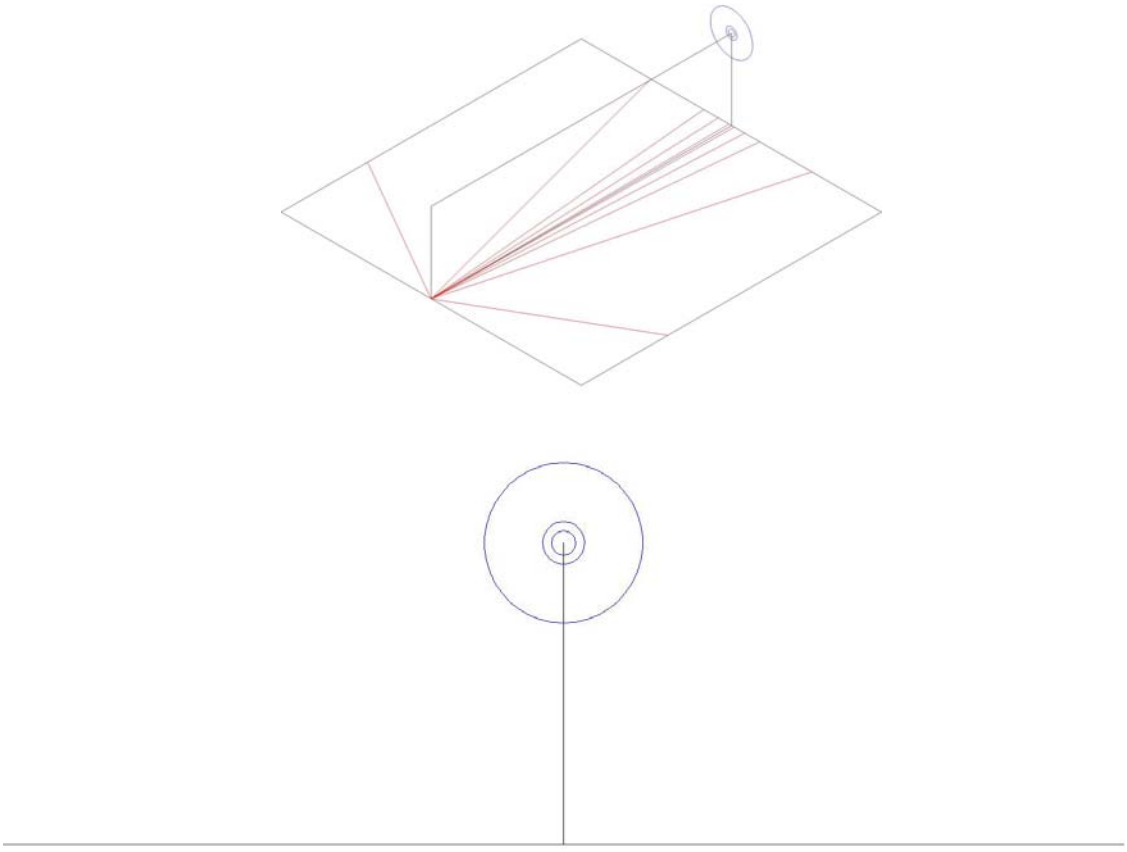


Binocular vision – 3 D view.

The Central Visual Field.

The central visual field divided in to following arias:

Central visual field – 3 D.



Central visual field – front.

Funktionelle standard størrelser i basisopstillingen:

PF: Peripheral Fusion Area (30 dg.) = diameter of central visual field. (85 cm)

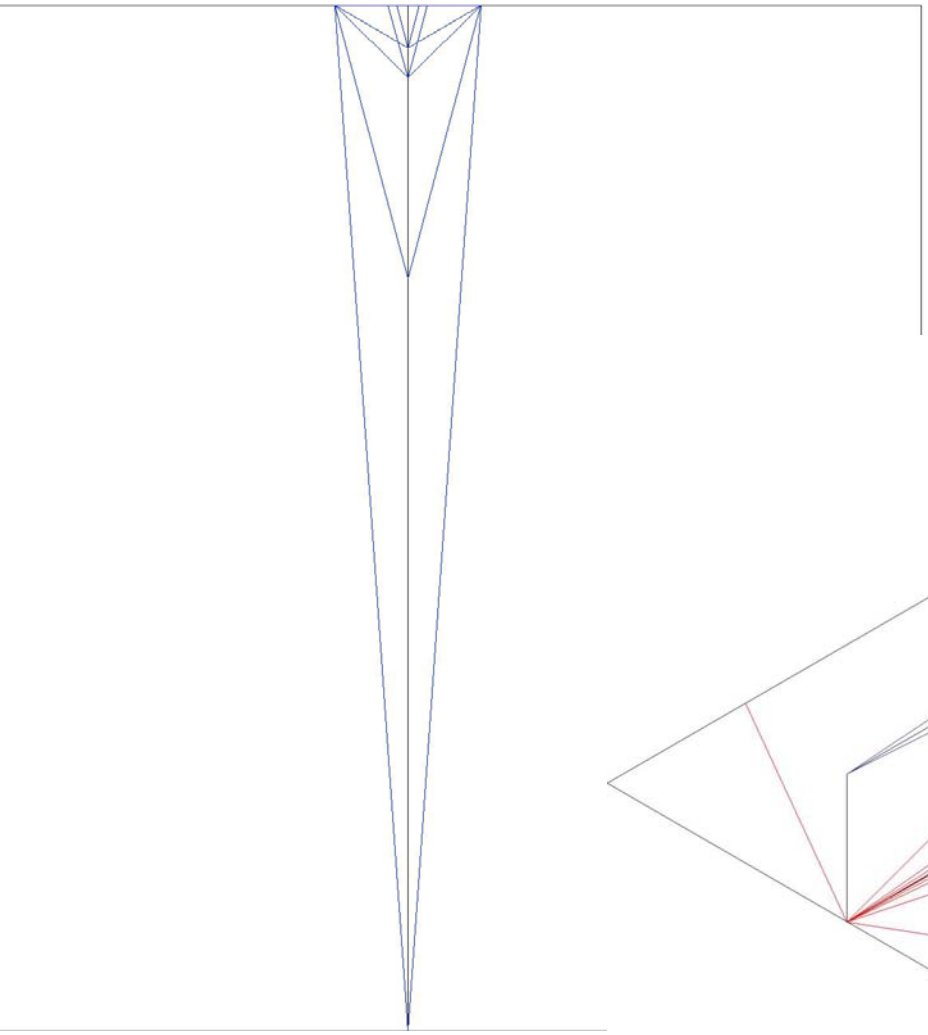
CF: Central Fusion Area (10 dg.) = diameter of central fusion field. (23 cm)

MO: Macula Area (5 dg.) = diameter of macula visual field. (13 cm)

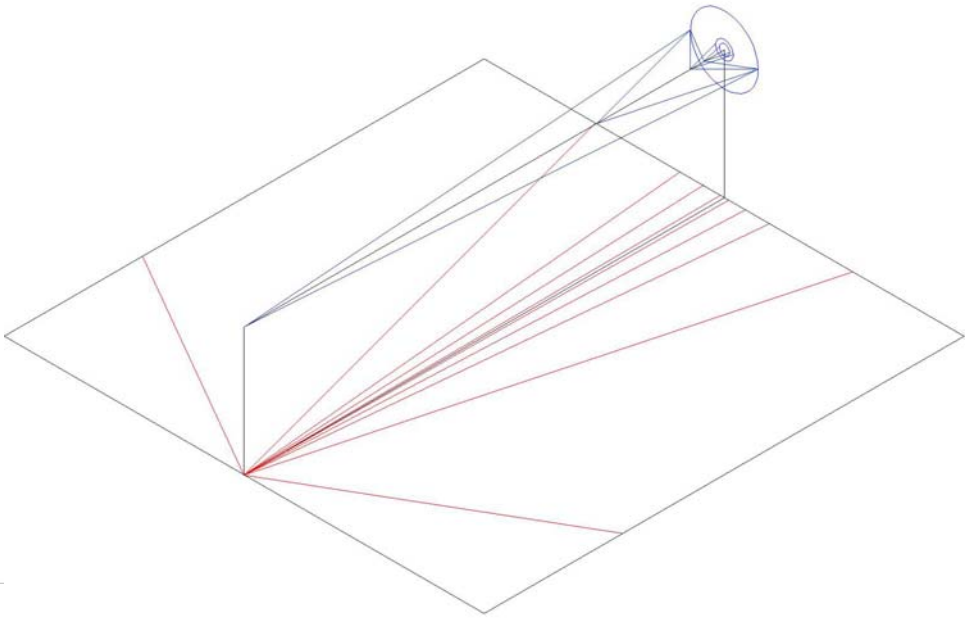
C: Central Fusion Point (1dg.) = fiksation point.

The Physiological Constant.

The physiological constancy is found by marking the top middle point of the blind spot of as well right as left eye, when the patient is looking at the fiksation point with one eye, and the opposite eye covered with the cover test. This technique can be used regardless to the examination distance.



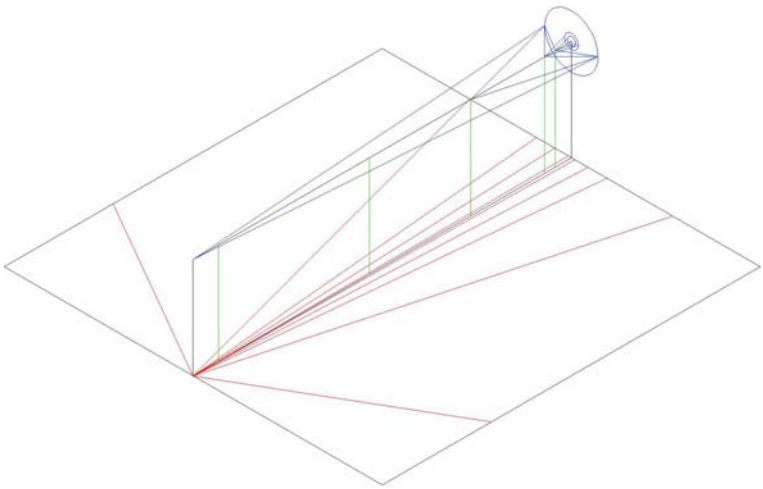
Physiological constancy – top.

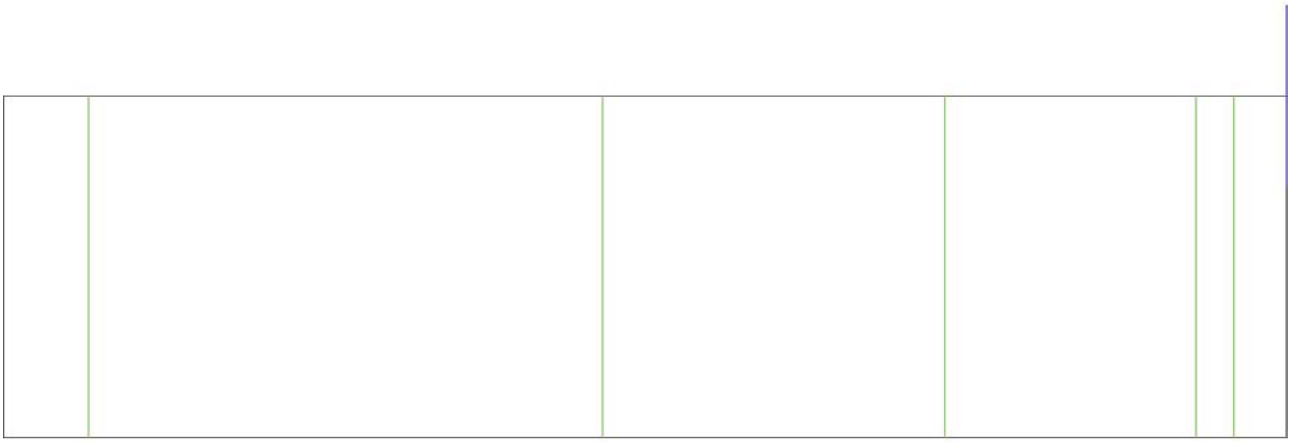


Physiological constancy – 3 D.

PF I BA: angel a = 30 grader = Peripheral fusion area = 2 x 15 grader.
CF I FN: angel a = 30 grader = Central fusion area = 2 x 15 grader.
MO I PN: angel a = 30 grader = Macula area = 2 x 15 grader.
Tangent 15 grader = 0,26795. PF = 2 x 0,26795 x BA (85,744)
Tangent 5 grader = 0,0875. CF = 2 x 0,0875 x BA (28,032)
Tangent 2,5 grader = 0,0437. MO = 2 x 0,0437 x BA (13,984)

Functional distances – 3 D.





FF **PD** **SD** **BA** **FN PN**

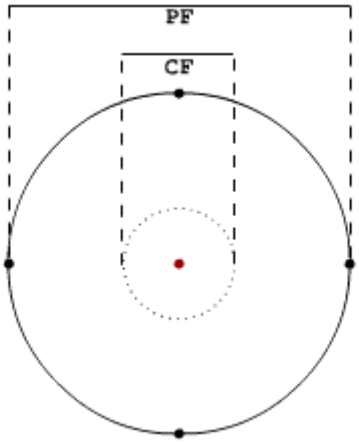
Functional distances - right.

Functional standard distances and size in central visual field calculated on the concept of the Physiological Constant.

BA: Basic Distance calculation = 600 x 0,2679 = 160,77

Functional standard distances:

FF:	Functional Far Distance	= Vision at far distance. (6 meter)
PD:	Perceptual Space Diameter	= threshold between far and mean distance.(460)
SD:	Visual Space Diameter	= Vision at mean distance. (320 cm)
BA:	Basic Distance	= Distance for individual starting point. (160 cm)
FN:	Functional Near Distance	= Optimal reading distance. (Harmon) 42,5 cm.)
PN:	Proximal Near Distance	= Shortest reading distance (25 cm)



Functional standards size in Central Visual Field:

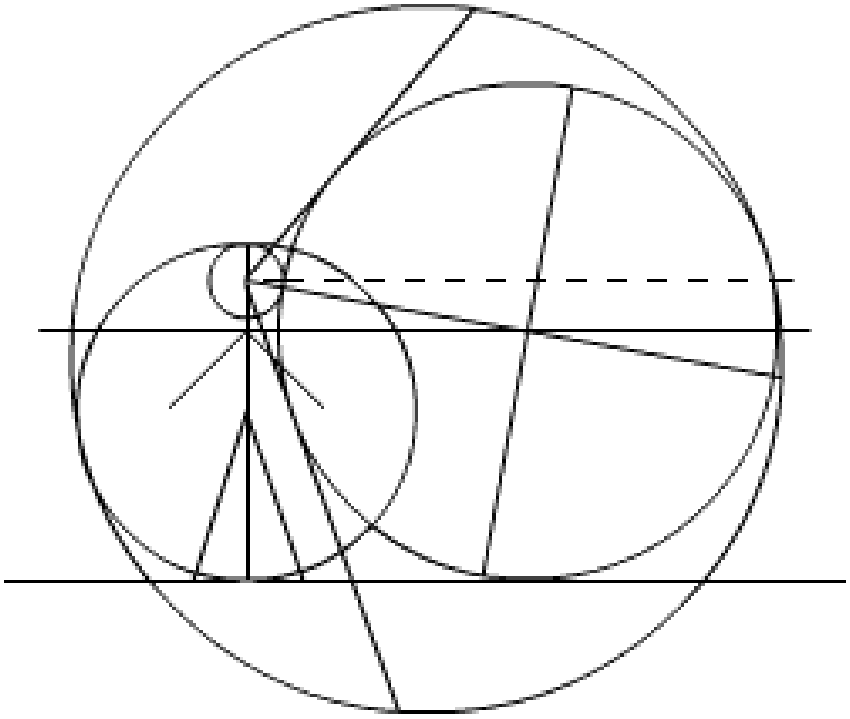
PF:	Peripheral Fusion Area (30 dg.)	= diameter of central visual field. (85 cm)
CF:	Central Fusion Area (10 dg.)	= diameter of central fusion field. (23 cm)
MO:	Macula Area (5 dg.)	= diameter of macula visual field. (13 cm)
C:	Central Fusion Point (1dg.)	= fiksation point.

Basic unit – a graphic illustration

Basic unit

- Illustrates the patient's individual perceptual space in three dimensions as a combination of body space and visual space. The distance from the patients eyes to the centre of the visual space ©, is the individual starting point, in which the patient is expected to have fair basic foundation for binocularity.

I----------Basic Distance.----------I



I----------Visual Space ----------I

I---------Body Space ------- I

I----------Perceptual Space ----------I

Calculation of standard size and distance based on the starting point – Basic Distance:

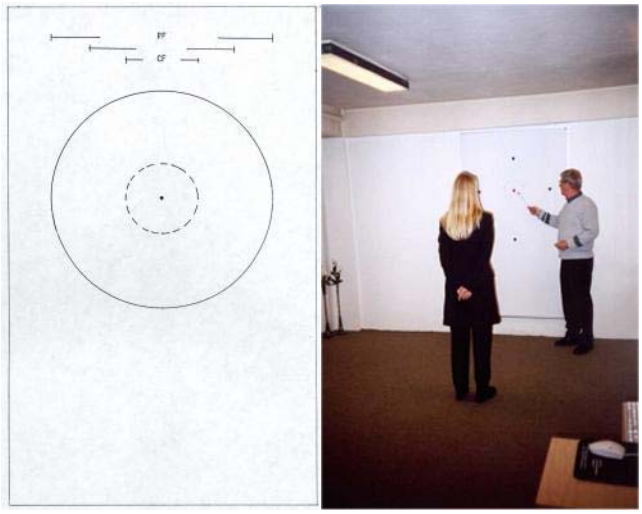
Dynamic Optometry– 2: Calculation

Abbreviations:		Calculation	Standards	Compared to:
Eye level	ØH	142,8437	174,4656	Personal height
Basic Distance	BA	131,0000	160,0000	Starting point
Functional Near Distance	FN	35,1015	42,8720	Optimal reading distance
Peripheral Fusion Area	PF	70,2029	85,7440	Central visual field
Central Fusion Area	CF	18,8575	23,0320	Central fusional area
Proximal Near Distance	PN	20,2657	24,7520	Shortest near didtance
Macula Area	MO	10,8599	13,2640	Macula area
Visual Space Diameter	SD	262,0000	320,0000	Visual middle distance
Perceptual Space Diameter	PD	374,5552	457,4720	Threshold for middle-long distance
Functional Far Distance	FF	489,0060	597,2592	Visual far distance
Far Distance Visual Acuity	FV	846,8495	1.034,3200	Remote distance for visual acuity
Stereopsis - positiv in	FN	9,4287	11,5160	Radius in Central Fusion Area
Stereopsis - positiv in	BA	35,1015	42,8720	Radius in Peripheral Fusion Area
Stereopsis - positiv in	SD	70,2029	85,7440	Diameter in Peripharal Fusion Area
Stereopsis - positiv in	PD	100,3615	122,5789	Positiv Stereopsis in PD
Stereopsis - positiv in	FF	131,0000	160,0000	Basic Distance
Positiv Fusion Distance in	FN	12,1204	14,8035	Positiv Stereopsis + radius MO
Positiv Fusion Distance in	BA	39,8041	48,6157	Positiv Stereopsis + radius CF
Positiv Fusion Distance in	SD	87,7536	107,1800	Positiv Stereopsis + radius PF:2
Positiv Fusion Distance in	PD	135,4630	165,4510	Positiv Stereopsis + radius PF:2
Positiv Fusion Distance in	FF	181,2507	221,3749	Posiiv Stereopsis + radius PD:2
Central Visual Field - radius	PF	35,1015	42,8720	Central Visual Field radius - left
Central Visual Field - radius	PF	35,1015	42,8720	Central Visual Field radius - right
Central Visual Field - radius	PF	30,3986	37,1280	Central Visual Field radius - up
Central Visual Field - radius	PF	39,8041	48,6157	Central Visual Field radius - down

Calculations in Dynamic Optometry must be compared to expected results in standards – or individual.

Dynamic Optometry – in Basic Position.

Basic set up on a white Board



The Basic set up can be accomplished as a standard procedure I Basic Position, in which the Physiological Constant is used for measuring the central visual field from the central fixation point C. The Central Visual Field is divided into the Peripheral Fusion Area PF and the Central Fusion Area CF.

The basic set up can be carried out in the standard basic position 160 cm. And must then follow the expected functional standards in size and distance.

Basic position can also be measured as the patient is placing a red magnet as fixation point on the white board just in front of his nose. Afterwards you must measure the distance from the white spot in the centre of the magnet and down to the floor. This distance must now be market as the patient's individual basic position in front of the white board.

When this last procedure is used as basis for calculation of individual size and distance, the calculation of eye level is corresponding to personal stature as BA x 1,0904 (e.g. 160 x 1,0904 = 174,4656). And Functional Near Point is corresponding to Harmon Distance as BA x 0,26795 (e.g. 160 x 0,26795 = 42,872), which is the distance fra allow to front knuckles.

By recommendation:
All functional sizes and distances must be marked and measured with a Tape Measurer or a Laser Meter for accuracy and convenience.

The Central Visual field – used as the area for measuring.

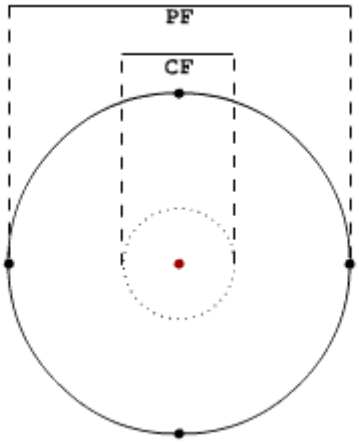
The examination of the patient takes place with in the central visual field, which is measured individually for right and left eye from a fixation point in the middle of the white board – five degrees below eye level.

From that point of fixation the central visual field is divided into the Peripheral Fusion Area measured in the Basic Distance (BA), the Central Fusion Area measured in the Functional Near distance (FN), and the Macula Area measured in the Proximal Near distance (PN).

The horizontal extension of the Central Visual Field corresponds to 2 x 45 degrees in Functional Near Distance, and the vertical height corresponds to 40 degrees up and 50 degrees down, and are all marked for their distinction by four black magnets. For subject as curser in measuring the Central Visual Field take use a ball of about 12 mm on a stick. Move it from the centre and out until the patient can recognise the ball disappear in the top of the “blind spot”.

By using a smaller subject of about 3 mm as curser, you can now follow the same procedure in measuring the horizontal extension of the Central Fusion Area in Functional Near Distance, - and the Macula Area in the Proximal Near Distance.

When the Basic Set Up is finished let the patient verify the horizontal and vertical sections manual – and control them both by using a level.



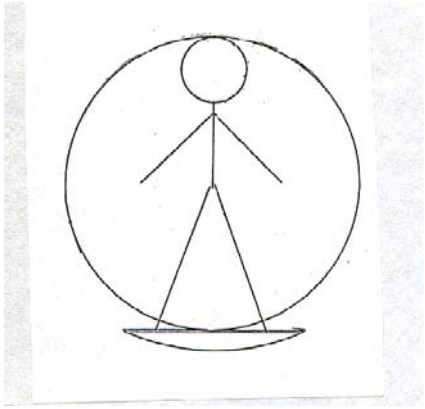
Functional standards size in Central Visual Field:

PF:	Peripheral Fusion Area (30 dg.)	= diameter of central visual field. (85 cm)
CF:	Central Fusion Area (10 dg.)	= diameter of central fusion field. (23 cm)
MO:	Macula Area (5 dg.)	= diameter of macula visual field. (13 cm)
C:	Central Fusion Point (1dg.)	= fixation point.

Checking of Coordination in Visual Space and Body Space on the balance board.

1. Place the balance board in basic position in front of the patient.
2. Ask the patient to verify the balance board until the centre is positioned right in front of the centre of the Basic set up.
3. Ask the patient to clime the balance board confronting the Basic set up.
4. Ask the patient to place the feet slightly apart – on both sides of the centre of balance board.
5. Place the level on the balance board, - and check if the patient is in balance.
6. Note the patient's deviations in your paper.
7. Note the following deviations: stable, unstable, tilting left, tilting right, correcting.

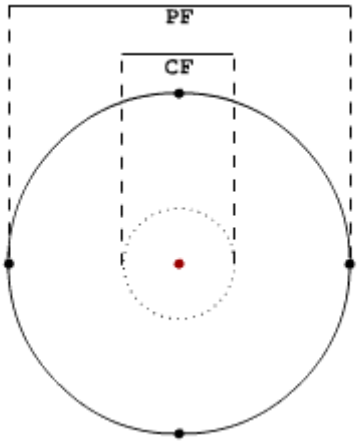
Balance Board.



1. Stable
2. Unstable
3. Tilting left
4. Tilting right
5. Correcting.

Dynamic Optometry – Visual Examination Techniques.

Measurering of the Basic Set Up.

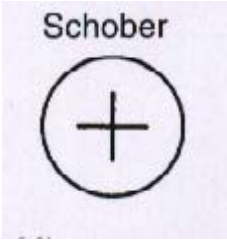


All visual tests and examinations of visual basic functions are taking place within the Central Fusion Area – of the Basic set up. By this it is possible to check the presence or lack of individual basic visual functions, - and its functional level.

All measurements are furthermore performed in the following standard distances of 600, 460, 320, 160 and 42,5 cm., or in the calculated individual distances. By this it is possible to check the presence of different basic functions in the expected functional distances.

Visual Examination Tests.

1. Shober Duocrome test.
The Shober test is a fixation test seen through red and green filters as a red cross in the centre of a green circle used as a control of monocular central fixation, that central fixation can bee maintained in all distances from near distance 42,5 cm and up to 600 cm. at far distance. Starting with checking on right eye - the left eye, and then finally on both eyes by adding a reed cross drawn in a complementary red upon the cross of red light. The outcome must be noted as ortho, eso or exo at the actual distance.

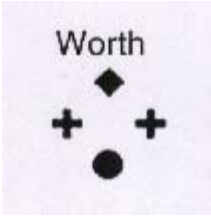


2. Central Fusion Test.
The central fusion test is also a duocrome test, with a white spot of light seen through red-green filters as a combined white or yellow light spot as a control of central fusion, and if the central fusion can bee maintained at all distances from 42,5 cm up to 600 cm. If the light spot is seen as red, there has to be a central suppression at the opposite eye, and visa versa when the light spot is green. The outcome of the test must be noted as central fusion, or suppression at the actual distance.



3. Associated Foria Test.
Associated Foria Test is a duocrome test, with a white light spot seen through red-green filters as a white or yellow spot, as a control of central fusion, Above the light spot is a green line and below is a red line drawn with a speed marker in complementary colours to test the associated foria in all distances from 42,5 cm up to 600 cm. The outcome of the test must be noted as ortho, eso or exo at the actual distance

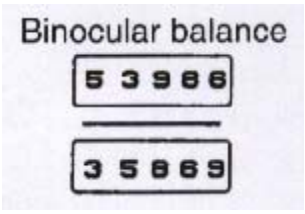
4. Worth 4-Dot Test.
A duocrome test seen through red-green filters, the right eye looking at the red top square and the bottom white light spot, and the left eye looking at both green crosses on right and left side – and the white light spot at the bottom. If all four symbols are seen on all distances from 42,5 cm and up to 600 cm, fusion can bee maintained within the central fusion area CF at all distances from near to far, and must bee noted as para central fusion. If the patient can only see two red symbols on the right eye, there is a suppression on the left eye, - and visa versa.



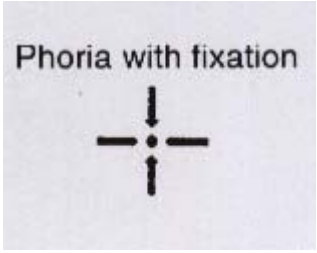
5. Test of Visual acuity on the Snellen Chart.
Testing of visual acuity on the Snellen Chart, as the patients is watching the optimal visual acuity 1,0 from basic distance BA as and as far out as possible, e.g. from 160 cm. up to 600 cm. On the right eye, the left eye and both eyes. In this case visual acuity must bee noted as performed in the actual distances.



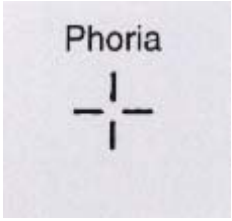
6. Binocular Balance Chart – polarized.
This test is a polarized binocular balance test, performed on a pearl screen situated in the central fusion area. With the original polarized lenses in front of the eyes the patient is tested under polarized dissociation, and tested for the distances where visual acuity can be seen for right eye, left eye and both eyes. The outcome of the test is distances where 1,o can be seen, and must be noted as performed.



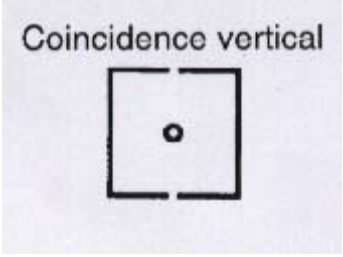
7. Associated Phoria Test with central lock of fusion – polarized.
The Associated Phoria test will tell you the distance of ortho, eso or exo foria somewhere between 42,5 cm. and up to 600 cm. The outcome must be noted the actual distances, - even in case of possible suppression. This test must be compared to Fixation Disparity Test.



8. Fixation Disparity Test – polarized.
The Fixation Disparity test will tell you about central fixation that is ortho in all distances from 42,5 to 600 cm., or may be eso or exo fixation. This test can be compared to the test of phoria. The outcome must be noted as the actual finding in the actual distance.



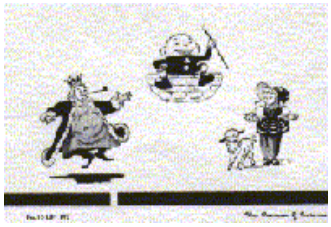
9.Test of Aniseiconia – polarized.
With this test you will be able to check if the patient can maintain the same magnification of the picture for both eyes in all distances from 42,5 to 600 cm. The difference of up to 1% will cause no trouble, from 1 – 3% might possibly give some trouble, from 3- 5% will cause trouble, - and more than 5% quite impossible to solve.



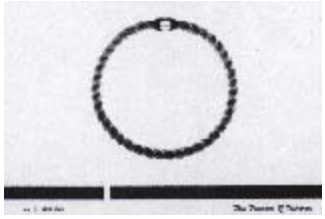
10. Minute Stereo Test.
With the Stereo Test it is possible to check if the patient can maintain as well positive as negative stereopsis simultaneously. It also possible to measure the positive stereopsis from the white board and out I space. In Basic standard Distance 160 cm the positive stereopsis is expected to be 42,5 cm, and in standard Functional Far Distance 600 cm. the positive stereopsis is expected to be 160 cm., or according to individual calculated distances. (ref. page 12). Compare the actual measure to the expected result.



11. Mother Goose – Vectogram Test.
Vectogram nr. 10 can be used to control positive and negative stereopsis simultaneously in all standard distances from 42,5cm. to 600 cm., or individual distances from Functional Near (FN) to Functional Far Distance (FN). The King in front, Mother Goos on the board, and the Man on the wall.



12. Quoits – Vectogram Test.
Vectogram nr. 2 – Quoits can be used to check and to measure the Distance of Positive Fusion from the white board and out in space. Compare the actual measurement to expected standards, or to expected individual results from page 12 – Calculation of standards or individual distances In Dynamic Optometry.



In Visual Space:
All functional distances must be marked with a pointer and measured with a Tape Measurer or a Laser Meter for accuracy and convenience.

Dynamic Retinoscopy.

Dynamic Retinoscopy is an examination technique, by which the optometrist is able to observe if the patient has established and can maintain binocular vision in all distances from 600 cm, 460 cm, 320 cm, 160 cm, 42,5 cm and all the way up to near point of convergence, - either as standards or individual calculated distances.

The optometrist is observing similarity or differences in movement, colour or glare of the light reflects in both eyes of the patient positioned at 600 cm. This is very easily observed in a streak retinoscope, where the light beam has been oriented horizontal, and is moved in vertical direction. This gives the optometrist the opportunity to observe both eyes simultaneously.

If binocularity previously has been examined and confirmed at 600 cm, for example with an associated polarised test, this can be checked up on with the retinoscope. When the light reflects are identical in movement, colour and glare in both eyes, binocularity is likely to be maintained.



The optometrist will now ask the patient to move slowly and calm towards him, and will simultaneously observe the changes of light reflects in movement, colour and glare.

If there is to be observed differences in glare – one eye will grow dull.
If there is to be observed differences in colour – one eye will grow darker.
If there is to be observed differences in movement – one eye will show increased movement. Smaller equal movements in both eyes might show mere flexibility.

All three observations are symptoms of decrease of binocularity in the above-mentioned order.

If the observations are simultaneously and equal in both eyes the patient continues moving towards the optometrist in all distances from 600 cm – 42,5 cm. The optometrist must observe and note any change at all for specific distances.

Dynamic Retinoscopy can be extended to near point distance by using a wooden or steel ball, which the optometrist reaches out against the patient in arms length. Move the ball back towards the optometrist and ask the patient to follow the ball with both eyes. Continue beyond Harmony Distance and up to the patients near point of convergence, and you will observe even slight tendencies of suppression – or actual suppression just before it happens, as the patient can no longer maintain binocularity.

Seen it once – and you will know it forever.

O. Dormann Frandsen.

Summary.

Dear friends and colleagues.

As you will see from this lecture Dynamic Optometry can bee practiced by any well educated and well learned optometrist, who wants to help his or her patients in solving binocular anomalies by means of optical visual aid and binocular visual therapy.

Please remember that 15-20% of a population is expected more or less to suffer from binocular anomalies to some degree. A major part is expected solved by means of optical visual aid; - the rest needs binocular visual therapy as well.

We all know that kind of patients, and have learned about the daily inconveniences they suffer from. And we are very much aware of, what can be done – must be done.

As well educated optometrists it is our job to respond to that challenge, and to offer our assistance to these patients in solving their binocular anomaly with the utmost optometric visual care.

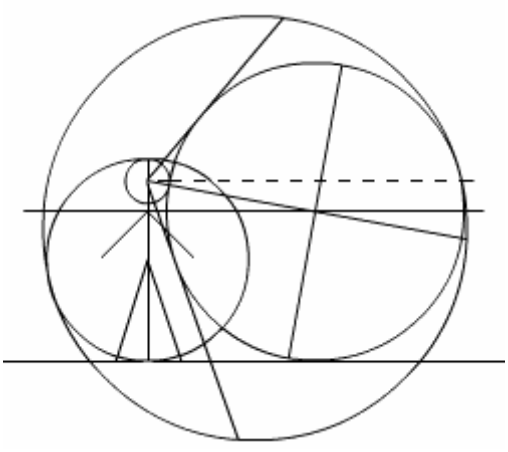
And for that reason I suggest you think about Dynamic Optometry as a possible supplementary visual examination technique – for you and your patients.

And do remember the words of the famous french author Antoine De Saint - Exypéry in his novel "The Little Prince"

Beauty is in the eye of the beholder.

Thank you very much for your attention,

O. Dormann Frandsen.



Dynamic Optometry - © - All rights reserved.