

SOE 2009

THE 17TH CONGRESS OF THE EUROPEAN SOCIETY OF OPHTHALMOLOGY

13-16 JUNE 2009 AMSTERDAM, THE NETHERLANDS



EBOD 2009 Examination: Statistical evaluation of the results

SOE C14 (EDU) – How to be successful at the EBO examination? – June 14th, 2009



No potential conflict of interest
to disclose ...

MSc. Danny G.P. Mathysen
EBOD Assessment Officer

Antwerp University Hospital
Department of Ophthalmology
Wilrijkstraat 10 – B-2650 Edegem
 danny.mathysen@uza.be

A decorative graphic on the left side of the slide, featuring overlapping squares in yellow, red, and blue, with a black crosshair intersecting them.

EBO Diploma Examination

- EBO Diploma Examination
 - Test designed to assess **knowledge** and **clinical skills** requisites to deliver a **European standard** of ophthalmologic care in hospital and private settings.
 - Organised on a **yearly basis** since its introduction in June 1995

Components of education

- Knowledge

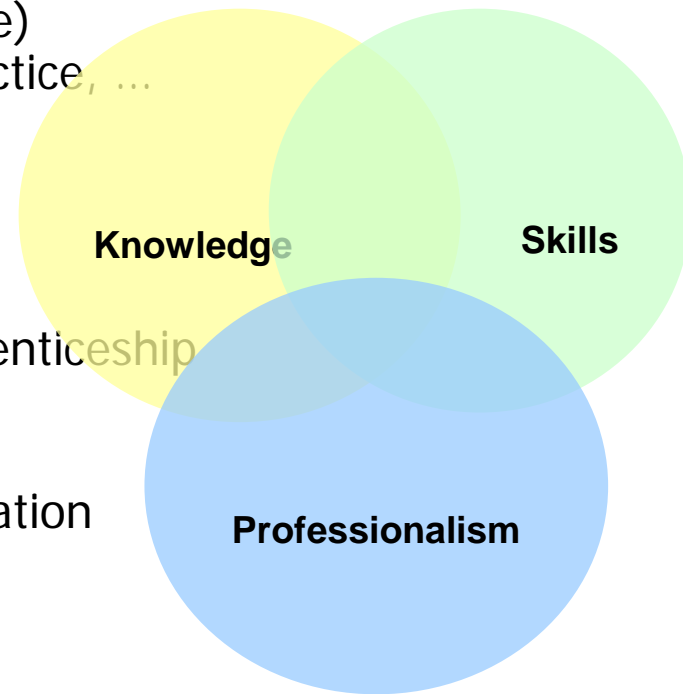
- Textbooks, guidelines, articles, (online) courses, clinical ophthalmological practice, ...
- **EBOD MCQs + EBOD Viva Voce**

- Skills

- Practical/technical skills
→ measure of ophthalmological apprenticeship

- Professionalism

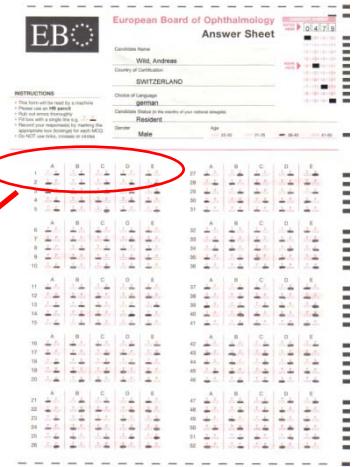
- Personal skills: empathy, attitude, relation with related paramedicals, ...



Structure of EBOD

■ Written paper

- 52 MCQs with 5 T/F items each (260 items)
- 10 topics (see EBO website)
- **40 percent** of total candidate score
- Languages: **English, French, German**
- Assessment of **knowledge**



The image shows a sample of the EBOD Answer Sheet. It includes the EB logo, the text 'European Board of Ophthalmology Answer Sheet', and fields for Candidate Name, City, Address, Country of Birth (SWITZERLAND), and Date of Birth. Below this is a grid for marking answers. A red circle highlights the top row of the grid, which contains the letters A, B, C, D, and E, corresponding to the five T/F items in each MCQ.



■ Oral examination (Viva Voce)

- 4 different topics (see EBO website)
- **60 percent** of total candidate score
- Languages: **English** (native language)
- Assessment of **knowledge**



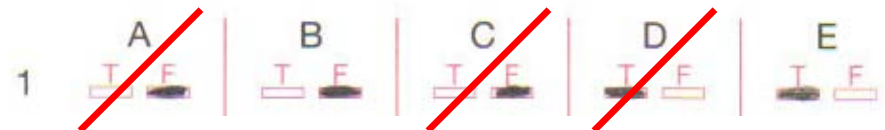
Written paper (MCQs)

1. The age of onset of presbyopic symptoms
- a. Is earlier for a patient with a small amplitude accommodation **TRUE**
 - b. Is earlier for a hyperopic patient who wears contact lenses rather than spectacles **FALSE**
 - c. Is earlier for a myopic patient who wears contact lenses rather than spectacles **TRUE**
 - d. Is earlier for a myopic than a hyperopic patient who wears spectacles with full distance correction **FALSE**
 - e. Is earlier for a short than a tall patient **TRUE**

Example on EBO website

STEM

LEAVES



Correct answers (2 out of 5) are rewarded with 1 point
 → This candidate receives 2 points



Written paper (MCQs)

- Scoring of the written paper
 - For each candidate a **total test score** is calculated (theoretical range: 0 – 260)
 - ➔ sum of all items answered correctly by the candidate
 - The **average total test score** with according **standard deviation** is calculated
 - Based on the position of the individual total test score according to the average total test score, the candidate will receive a **mark** that will be situated **between 1 and 10**
 - This MCQ mark counts for **40 percent** of the total EBOD score



Written paper (MCQs)

- Advantages for EBO candidates of T/F items
 - Reliable in case of translation (English, French, German)
→ choice of language will not result in being (dis)advantaged
 - Accessibility (e.g. dyslexia)
→ not too complicated for candidates
 - Duration of the examination
→ stress level of candidates can be kept to a minimum
 - Relatively easy to process
→ results can be presented on-site
- Disadvantage for EBO candidates of T/F items
 - Probability of guessing right = 50 %
→ level of weakest candidates is overestimated (→ oral examination)

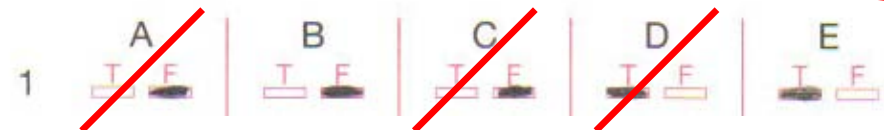
Written paper (MCQs)

1. The age of onset of presbyopic symptoms
- a. Is earlier for a patient with a small amplitude accommodation **TRUE**
 - b. Is earlier for a hyperopic patient who wears contact lenses rather than spectacles **FALSE**
 - c. Is earlier for a myopic patient who wears contact lenses rather than spectacles **TRUE**
 - d. Is earlier for a myopic than a hyperopic patient who wears spectacles with full distance correction **FALSE**
 - e. Is earlier for a short than a tall patient **TRUE**

Example on EBO website

STEM }
LEAVES }

NEGATIVE MARKING



Correct answers (2 out of 5) are rewarded with 1 point
 Incorrect answers (3 out of 5) result in **-1 point**
 → **This candidate receives -1 point**



Written paper (MCQs)

- Scoring of the written paper **NEGATIVE MARKING**
 - For each candidate a **total test score** is calculated (theoretical range: -260 – 260)
 - ➔ sum of all items answered correctly by the candidate
minus sum of all items answered incorrectly by the candidate
 - The **average total test score** with according **standard deviation** is calculated
 - Based on the position of the individual total test score according to the average total test score, the candidate will receive a **mark** that will be situated **between 1 and 10**
 - This MCQ mark counts for **40 percent** of the total EBOD score

**YOUR CHANCES TO PASS WILL NOT DECREASE
BY INTRODUCING NEGATIVE MARKING**

Oral examination (Viva Voce)





Oral examination (Viva Voce)

- Scoring of the oral examination
 - For each candidate a **viva voce score** is given for each topic (theoretical range: 1 – 10)
 - Each **individual viva voce score** counts for **15 percent** of the total EBOD score

$$EBOD_i = [0.4 \times MCQ_i] + [0.15 (VVa_i + VVb_i + VVc_i + VVd_i)]$$



40 % MCQ-score



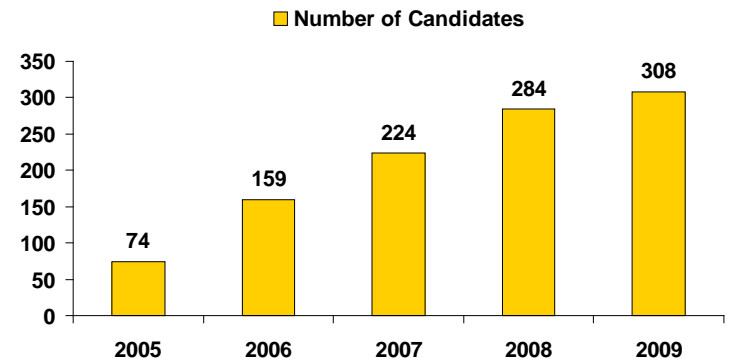
60 % Viva Voce score

Statistical analysis of EBOD 2009

Yearly increase of candidates

■ SpeedWell

- SpeedWell is specialised in organising medical examinations
- Optical reader system
 - continuous and yearly increase of applications / interest in EBOD
- Provided software tools
 - Design of the MCQ answer sheet
 - Design of the Viva Voce mark sheets
 - Statistical analysis output (MultiQuest®) based on similar statistical techniques



Demographics of EBOD 2009

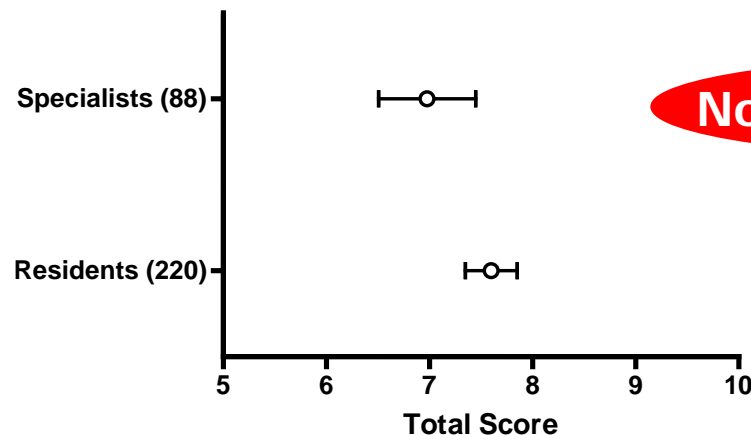
Many EU countries apply

Country	2008	2009	Δ	Country	2008	2009	Δ
Austria	2	5	↑	Latvia	2	1	↓
Belgium	23	25	↑	Lithuania	1	1	→
Bulgaria		4	↑	Norway		1	↑
Czech Republic	2	2	→	Poland	1	2	↑
Denmark	4	6	↑	Slovakia	1	1	→
Estonia	3	2	↓	Slovenia	6	5	↓
Finland	7	2	↓	Spain	14	17	↑
France	92	96	↑	Sweden	6	5	↓
Germany	44	59	↑	Switzerland	32	29	↓
Greece	10	19	↑	The Netherlands	7	7	→
Hungary	1	2	↑	Turkey	11	5	↓
Ireland	5	5	→	United Kingdom	2	1	↓
Italy	4	6	↑	Total	284	308	↑

EBOD 2009: Analysis of MCQs

- MCQ total scores
 - Range of total scores: 154 – 230
 - Mean \pm SD total score: 204.11 \pm 13.04

EBOD 2009 MCQ Scores
with 95 % Confidence Intervals



No significant difference!

Residents	n = 220	205.40 \pm 12.18	Specialists	n = 88	200.91 \pm 14.41
-----------	---------	--------------------	-------------	--------	--------------------

EBOD 2009: Analysis of MCQs

No significant differences!

	Belgium	Switzerland	Germany	France
Residents	n = 21 207.71 ± 10.96	n = 29 207.97 ± 12.22	n = 39 209.67 ± 10.46	n = 84 201.52 ± 11.22
Specialists	n = 4 181.25 ± 20.22		n = 20 206.10 ± 15.57	n = 12 200.58 ± 15.20
Total	n = 25 203.48 ± 16.14	n = 29 207.97 ± 12.22	n = 59 208.46 ± 12.54	n = 96 201.41 ± 11.80

Residents have **higher total MCQ scores** with **lower standard deviations** when compared to specialists.

In general there are **no statistically significant differences** between **countries**.

EBOD 2009: Analysis of MCQs

EBOD is not a language test!

	English	German	French
Residents	n = 58 205.98 ± 12.54	n = 61 209.46 ± 11.51	n = 101 202.60 ± 11.62
Specialists	n = 53 200.08 ± 12.71	n = 21 205.67 ± 15.27	n = 14 196.93 ± 17.06
Total	n = 111 203.16 ± 12.96	n = 82 208.46 ± 12.54	n = 115 201.91 ± 12.55

Residents have **higher total MCQ scores** with **lower standard deviations** when compared to specialists.

In general there are **no statistically significant differences** between **languages**.

EBOD 2009: Analysis of MCQs

- Cronbach's coefficient alpha (r) = 0.78
 - Estimator of the lower bound of the **internal consistency** (degree to which all MCQs leaves are measuring the same, i.e. knowledge of candidates) of EBOD 2009 (95% CI: 0.75 – 0.81)

internal consistency
of EBOD MCQ-test is good

$$r = \frac{260}{260 - 1} \left[1 - \frac{\sum_{i=1}^{260} \sigma_i^2}{\left(\sum_{i=1}^{260} Rit_i \sigma_i \right)^2} \right] = 0.78$$

EBOD 2009: Analysis of MCQs

- Point biserial correlation coefficient (R_{it}) = 0.14
 - Estimator of the correlation between the **individual item scores** X_i (either 0 or 1) and the **total MCQ scores** Y_i (ranging from 154 to 230) of the candidates

$$R_{it} = \frac{1}{n-1} \sum_{i=1}^n \left(\frac{X_i - \bar{X}}{s_X} \right) \left(\frac{Y_i - \bar{Y}}{s_Y} \right)$$

correlation between
item and total MCQ score

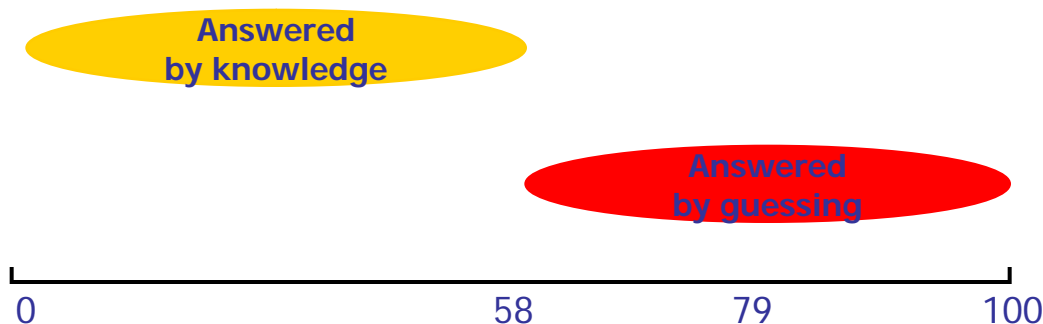
-1

0

+1

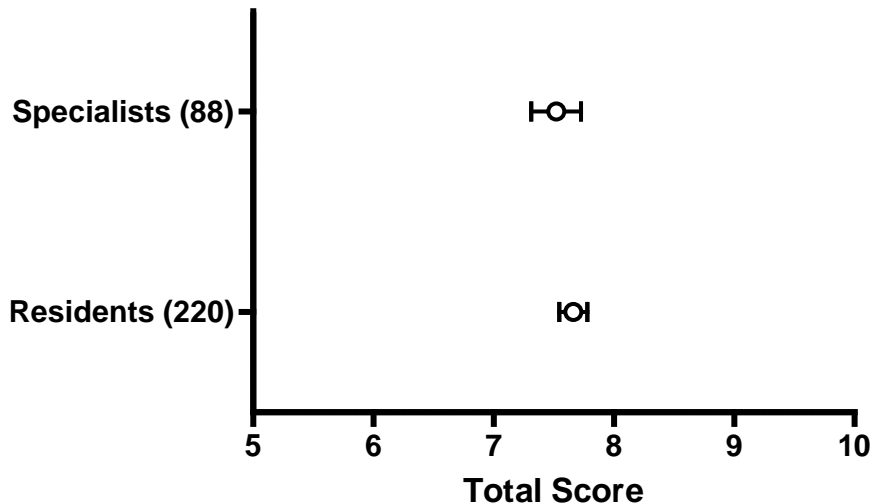
EBOD 2009: Analysis of MCQs

- Assessment of the degree of difficulty
 - Average P-value ≈ 0.79
 - Indication of items answered incorrectly by guessing ≈ 0.21
 - Estimation of items answered correctly by guessing ≈ 0.21
 - Estimation of percentage of candidates guessing ≈ 0.42
 - OR Estimation of percentage of candidates knowing ≈ 0.58



EBOD 2009: Viva Voce analysis

**EBOD 2009 Viva Voce Scores
with 95 % Confidence Intervals**



Topic	Score
A. Optics, Refractions, Strabismus and Neuro-ophthalmology	7.62 ± 1.32
B. Cornea, External diseases and Ocular adnexa	7.59 ± 1.29
C. Glaucoma, Cataract and Refractive surgery	7.45 ± 1.24
D. Posterior segment, Ocular inflammation and Uveitis	7.83 ± 1.28

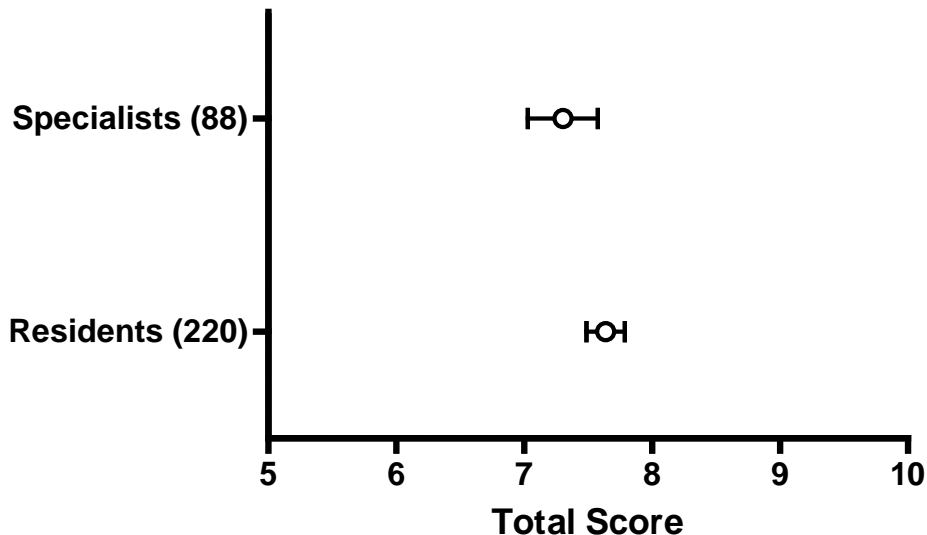
EBOD scores are high!

Residents have **higher Viva Voce scores** with **lower standard deviations** when compared to specialists.

No statistically significant differences between the topics.

EBOD 2009: General analysis

**EBOD 2009 Total Scores
with 95 % Confidence Intervals**



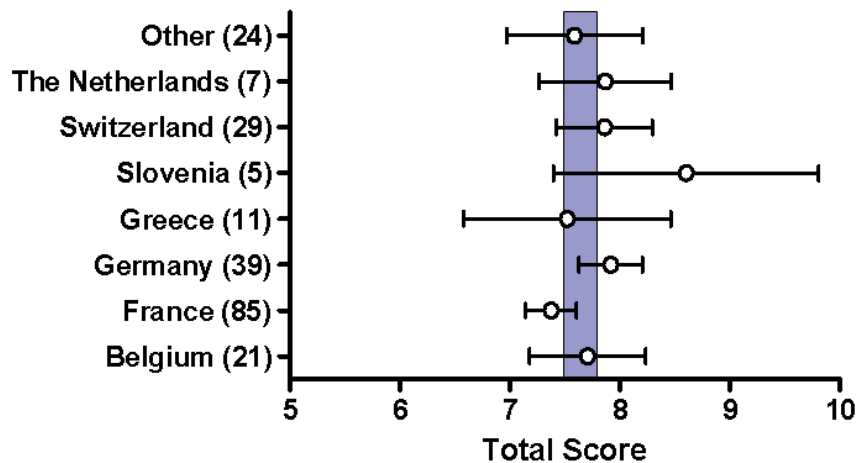
EBOD 2009	Score
Written examination (MCQ paper)	7.42 ± 2.01
Oral examination (Viva Voce)	7.62 ± 0.90
EBOD 2009 (MCQ + Viva Voce)	7.54 ± 1.18

EBOD scores are comparable for MCQ and Viva Voce!

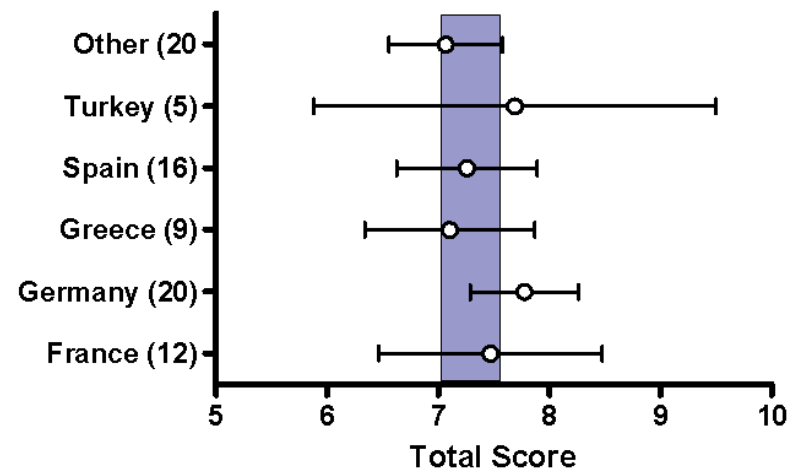
Residents have **higher Viva Voce scores** with **lower standard deviations** when compared to specialists.

EBOD 2009: General analysis

EBOD 2009 Total Scores Residents
with 95 % Confidence Intervals



EBOD 2009 Total Scores Specialists
with 95 % Confidence Intervals



Residents have **higher total scores** with **lower standard deviations** when compared to specialists.

No significant differences are observed between the **countries**.

EBOD 2009: Success rate

Success rate of EBOD is much higher as compared to other medical specialties (60-70 %)

	2005	2006	2007	2008	2009
Success Rate	87.6%	88.1%	89.2%	90.8%	89.6 %

EBOD **success rate** is quite **stable over the years** and quite high as the level of candidates usually tends to be good.

18 Residents (out of 220: 8.2%) and **14 specialists** (out of 88: 15.9 %) failed at EBOD 2009. As there were 308 candidates the general failure rate was 10.4 %.

A decorative graphic in the top left corner featuring overlapping squares in yellow, red, and blue, with a black crosshair overlaid on them.

In conclusion...

- There are absolutely **no reasons** for you **not to participate** at EBOD since ...
 - ... EBOD examination is a chance to show your **excellence** in ophthalmology on a **European** level
 - ... EBOD has a **high success rate** (compared to European examinations of other medical specialties)
 - ... It has been shown by EBO that the level of candidates participating is usually very good, which results in **very good individual marks**



In conclusion...

- There are absolutely **no reasons** for you **not to participate** at EBOD since ...
 - ... It has been demonstrated that **language** nor **country of origin** (dis)advantage candidates
 - ... It has been shown that **residents** perform well at prior EBOD editions
 - ... Introduction of **negative marking** will only be **beneficial** for good candidates! Furthermore introduction of negative marking **will not decrease** your **chances to be successful** at EBOD

In conclusion...



... Therefore EBO hopes to welcome you all at EBOD 2010!