

Perception: Psychophysics and Modeling

18 | Q & A |

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Critical feedback from the course evaluation

First of all to the $N = 11$ of you who participated: Thank you very much!

1. Quizzes with deadline—could they not be made accessible to everyone, whether they did them or not?

I really do not think this would be a good idea—there must be an incentive to do the Quizzes, and an advantage for those doing them. I know you are busy during term time; all you need to do for access is to click on the Quiz once and click through the questions

2. Not enough interactive elements or discussion or inverted classroom or at least some hands-on exercises during the lectures.

You are absolutely right—apologies for that. These elements play a much larger role during the presence lectures; I did not include any during the online lectures as I often find “interaction” in Zoom awkward and non-natural—but perhaps more my problem than yours: Thus I promise to have more next time, whether in presence or online.

Critical feedback from the course evaluation (cont'd)

3. Reading materials: Not always clear how much detail was necessary; general gist versus experimental details and understanding figures in depth.

Very good point: I will go over the Assignments pages again and add how much detail is necessary, and which aspects, sections or pages have to be carefully studied, which parts of a paper are important or essential etc.

Without wanting to sound patronising: In addition, sometimes knowing a paper better than required for the exam or a quiz is nonetheless valuable!

4. General overview lecture versus specialised details—better to have a general grasp than details?

No—you need to understand how the details and experiments lead to the general view. Thus I strongly believe you learn much more about science in general if you have to learn how “evidence” is generated, discussed and, perhaps, discarded! My aim is to provide both: For some topics an overview, but sometimes “drill deeper” into the details, evidence and the arguments made.

Exam: Place, date, format

The written exam will take place in (physical) presence in the lecture hall in the Maria-von-Linden-Str. 6. (This is the same room in which the first few in-presence lectures took place.)

Exam date: Thursday 10th of February 2022, 12:15 - 13:45 o'clock.

The exam will be an online exam similar to the quizzes you were provided with during the term. There is no need to bring your own laptop—you will get a University laptop for the exam. Please note that the laptops provided by the University computing service (ZDV) allow you to answer the exam questions but basically nothing else: they do not allow you, for example, to access the internet.

No exam registration required, neither in Alma nor via ILIAS: Everyone showing up can take the exam.

Exam: Covid-19 regulations

Covid-19 regulations: To be allowed to participate in the exam you have to provide proof of your 3G status: Recovered, vaccinated or with a current negative test result (24 hrs old at most).

At the entrance to the lecture hall there will be a check of every student's 3G status—without exception.

During the exam you may be required to wear a mask—I suggest you use a FFP2 (KN95) mask to be on the safe side: Regulations are currently changing frequently and sometimes at short notice; a medical or surgical mask may be permissible but if you bring a FFP2 (KN95) mask, you will be on the safe side no matter what (new) regulations are in place on the 7th of February.

Exam: Additional information

- Please arrive early, I suggest 12:00 o'clock at the latest to allow for sufficient time for the check of your 3G status as well as the distribution of the ZDV laptops.
- Please ensure you know your ZDV log-in credentials—without them you cannot take part in the exam!
- Please bring along your student ID—during the exam this will be checked, too.
- Please bring along a few sheets of paper and a pen or pencil—even in an online exam you may find it helpful to scribble down some ideas or thoughts or make yourself a sketch before typing in your answer.
- Open book exam—yes but ... only analogue means, e.g. handouts of the lectures, your own notes or even a book.

You are not allowed to use your smartphone, a tablet or laptop!

- You are allowed to bring and use your own pocket calculator, however!
- After the exam you are allowed to have a post-exam review ("Klausureinsicht")—just send me an email and we arrange a date and time to look at your exam together.

Exam: Additional information (cont'd)

- If there are “essay” questions: How strict/binding is the letter count?

There won't be an essay questions—if there were, the letter count would be super strict 😊

- What happens when the time is up before I hit all the submit buttons? Are the auto-save files usable for the assessment, or would the exam count as failed?

The auto-saves files are useable and will be used for your grade—no failure because you do not press the submit button!

BTW: Even if your internet connection were unstable and you loose your connection you can log-in again and continue with the exam at the last auto-save point.

- Mark lecture “types” in advance

Yes, will do in the Assignments document: Which lectures are detail, which are more overview, which topics require in depth knowledge, which ones require “only” definitions and main findings.

Exam overview

Lecture(s)	Topic	N	percentage of points
2	Linear systems, Fourier transform and optics	1	2 %
4	Psychophysics and Experimental Design	6	7 %
5-6	Spatial Vision	4	18 %
7-10	Object Recognition	8	16 %
11	Scene Perception	4	17 %
12-13	Visual Attention & Saliency	5	15 %
14-15	Colour Vision	8	10 %
16-17	Auditory Perception	2	15 %

Literature I suggest you know well for the exam ...

Biederman, I. (1987). Recognition-by-components: A theory of human image understanding. *Psychological Review*, 94(2), 115–147.

Campbell, F. W., & Robson, J. G. (1968). Application of Fourier analysis to the visibility of gratings. *The Journal of Physiology*, 197(3), 551–566.

(Figures 3 & 7 ... you need to know what they show and why it is important)

Torralba, A., & Oliva, A. (2003). Statistics of natural image categories. *Network: Computation in Neural Systems*, 14(3), 391–412.

Jäkel, F., & Wichmann, F. A. (2006). Spatial four-alternative forced-choice method is the preferred psychophysical method for naïve observers. *Journal of Vision*, 6(11), 13–13.

Wichmann, F. A., Drewes, J., Rosas, P., & Gegenfurtner, K. R. (2010). Animal detection in natural scenes: Critical features revisited. *Journal of Vision*, 10(4), 6–6.

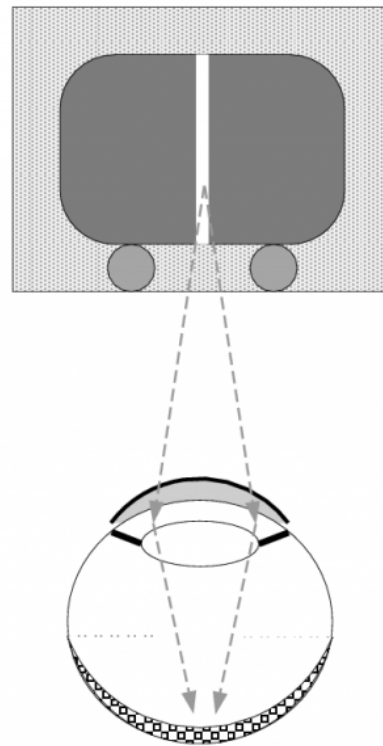
... in addition the anatomy of the auditory system and sound localisation!

LSF, PSF, MTF

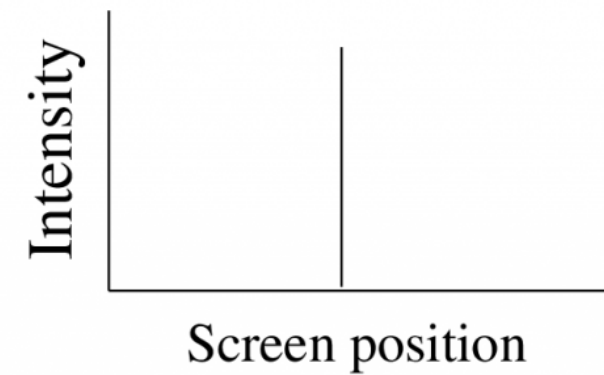
Application to Optics

Understand how to predict the retinal image from the screen image: what gets is encoded by the retina

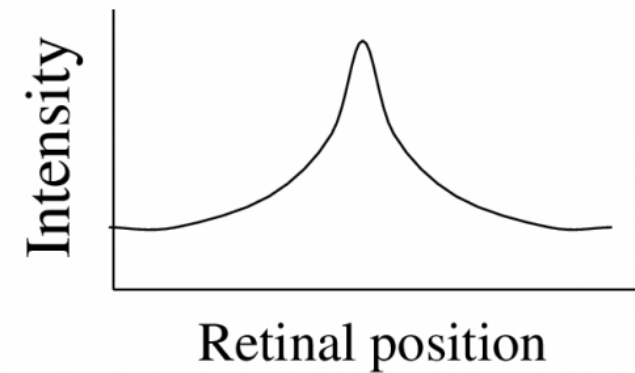
(a)



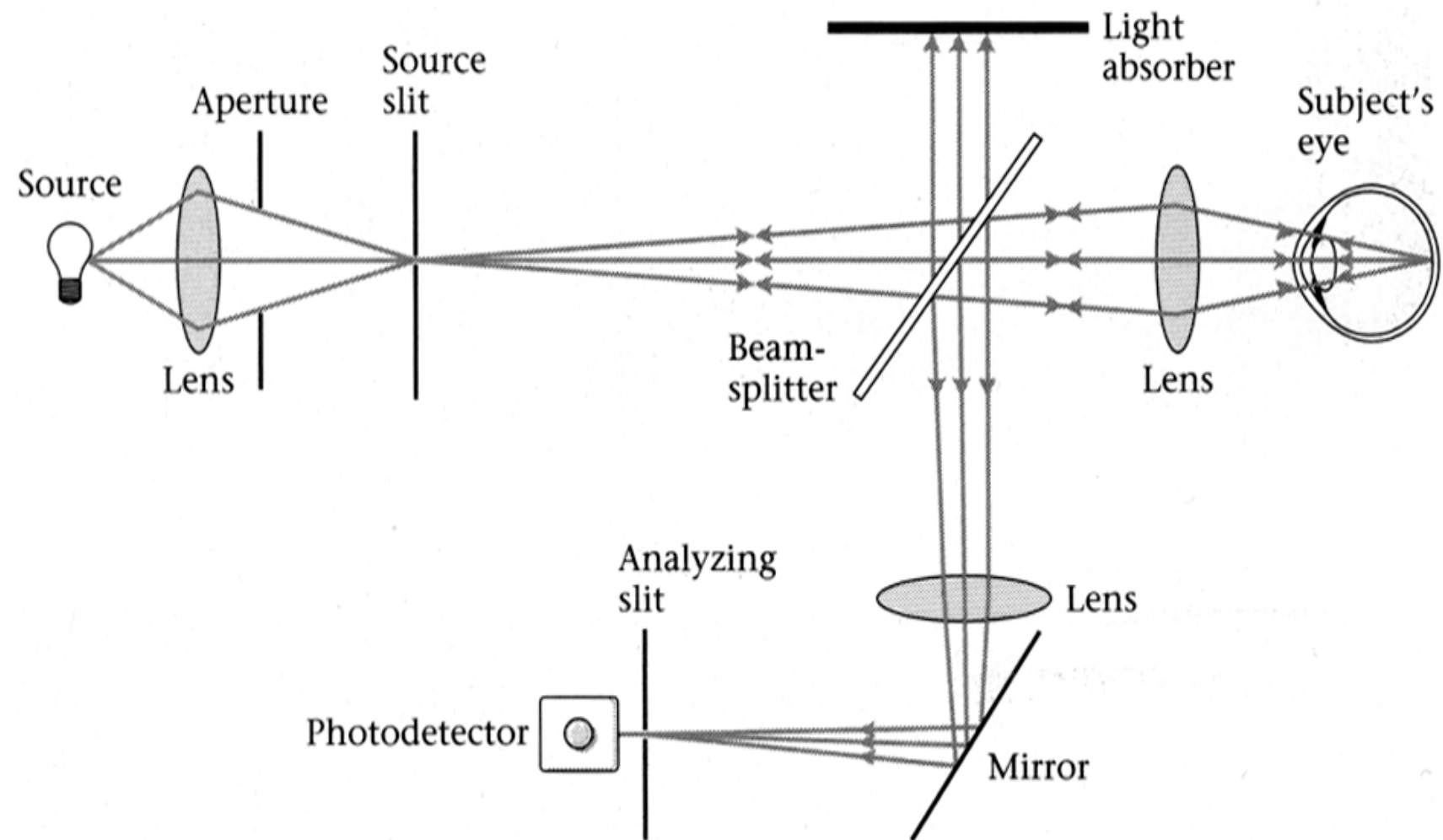
(b)



(c)

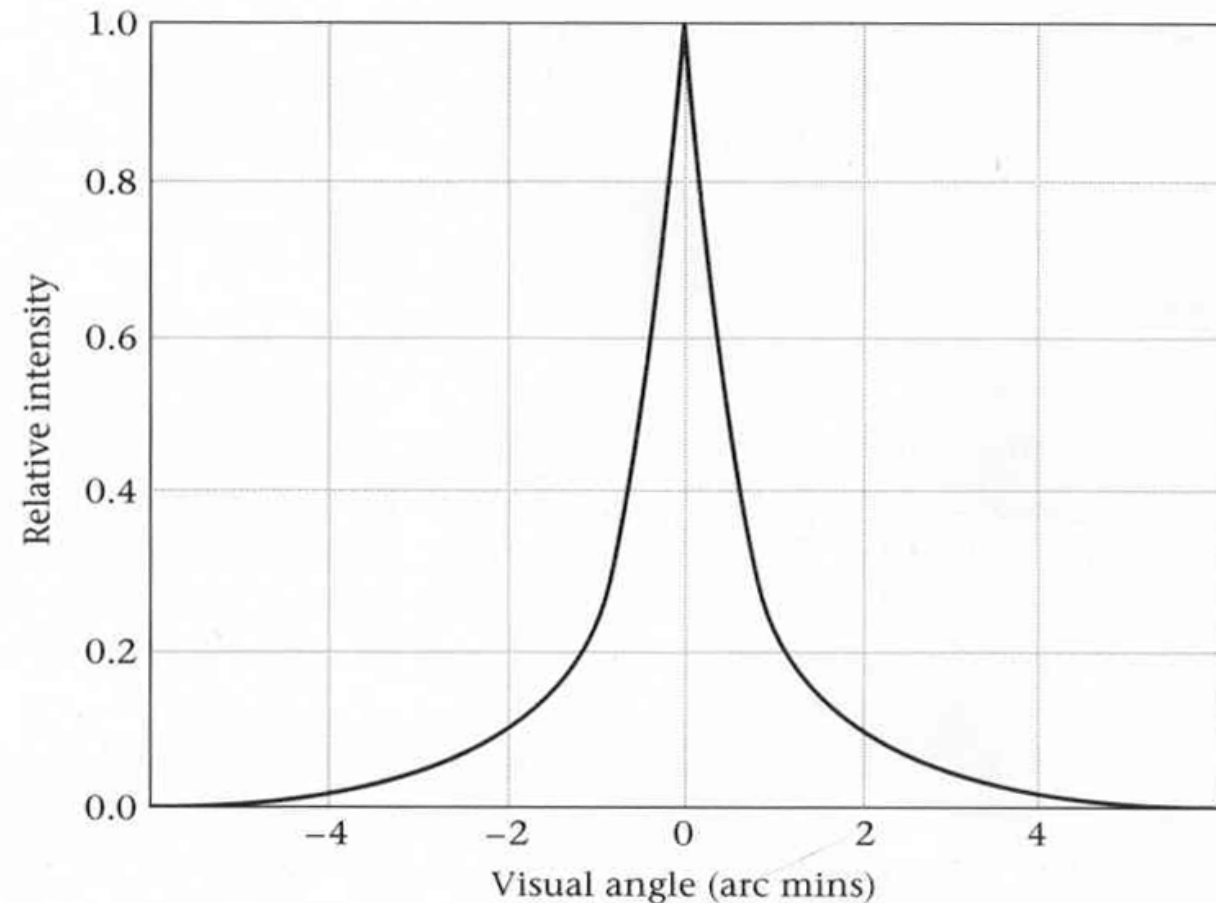


Modified Ophthalmoscope



Human LSF

**Impulse
view of a
linear
system in
the space
domain**

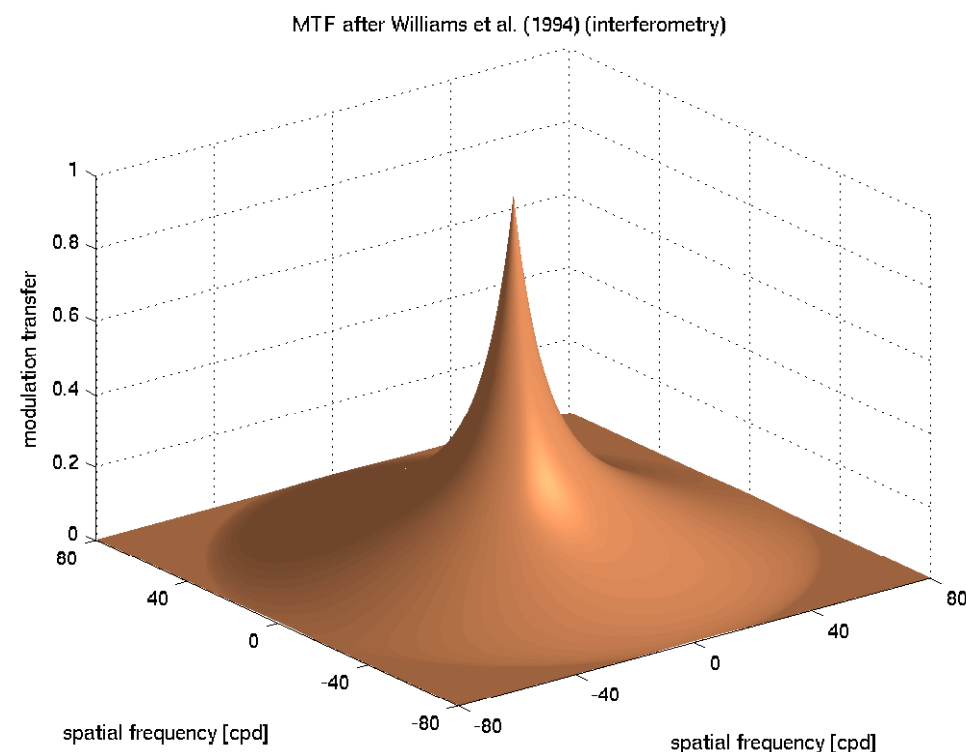
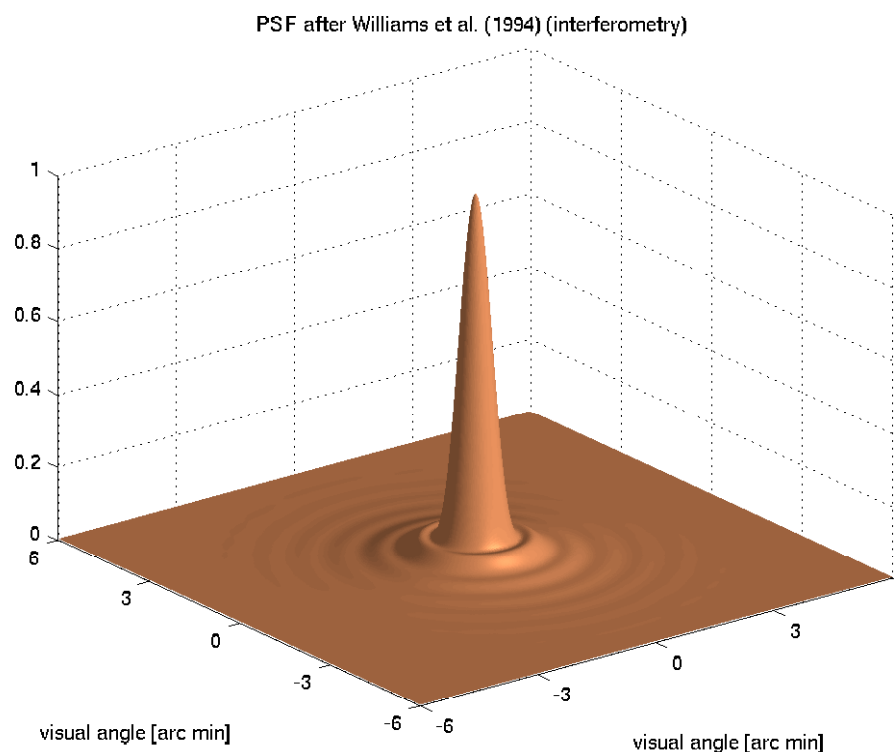


Modern measurement by WESTHEIMER (1986), WILLIAMS et al. (1984; interferometry) and LIANG & WILLIAMS (1997; wave-front sensor methods)

Human PSF and MTF

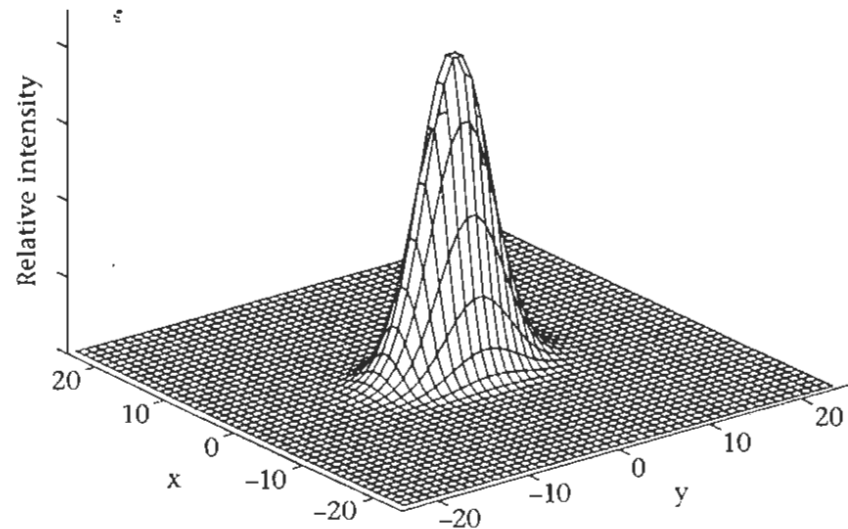
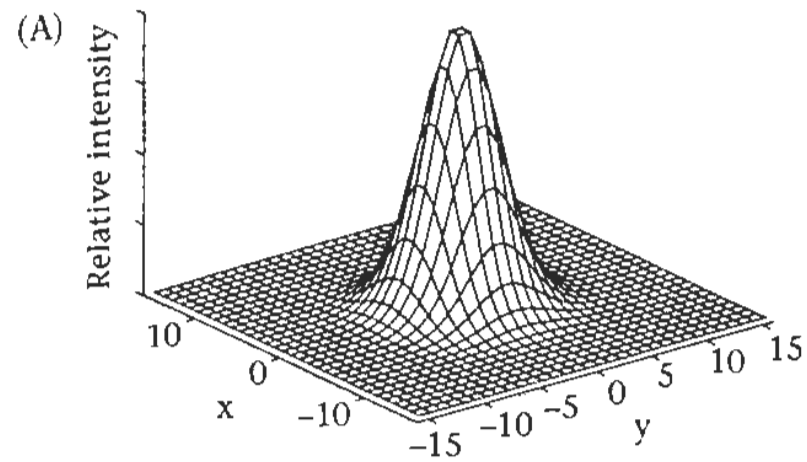
The modulation transfer function (MTF) is simply the Fourier transform of the LSF or the PSF (in 1-D or 2-D). It shows the ratio of the output-to-input amplitude at a given frequency (no phase information)

Because application of the Fourier transform simply represent exactly the same information in a different way, the MTF and LSF/PSF are two ways of viewing the same thing: the optical quality of the eye

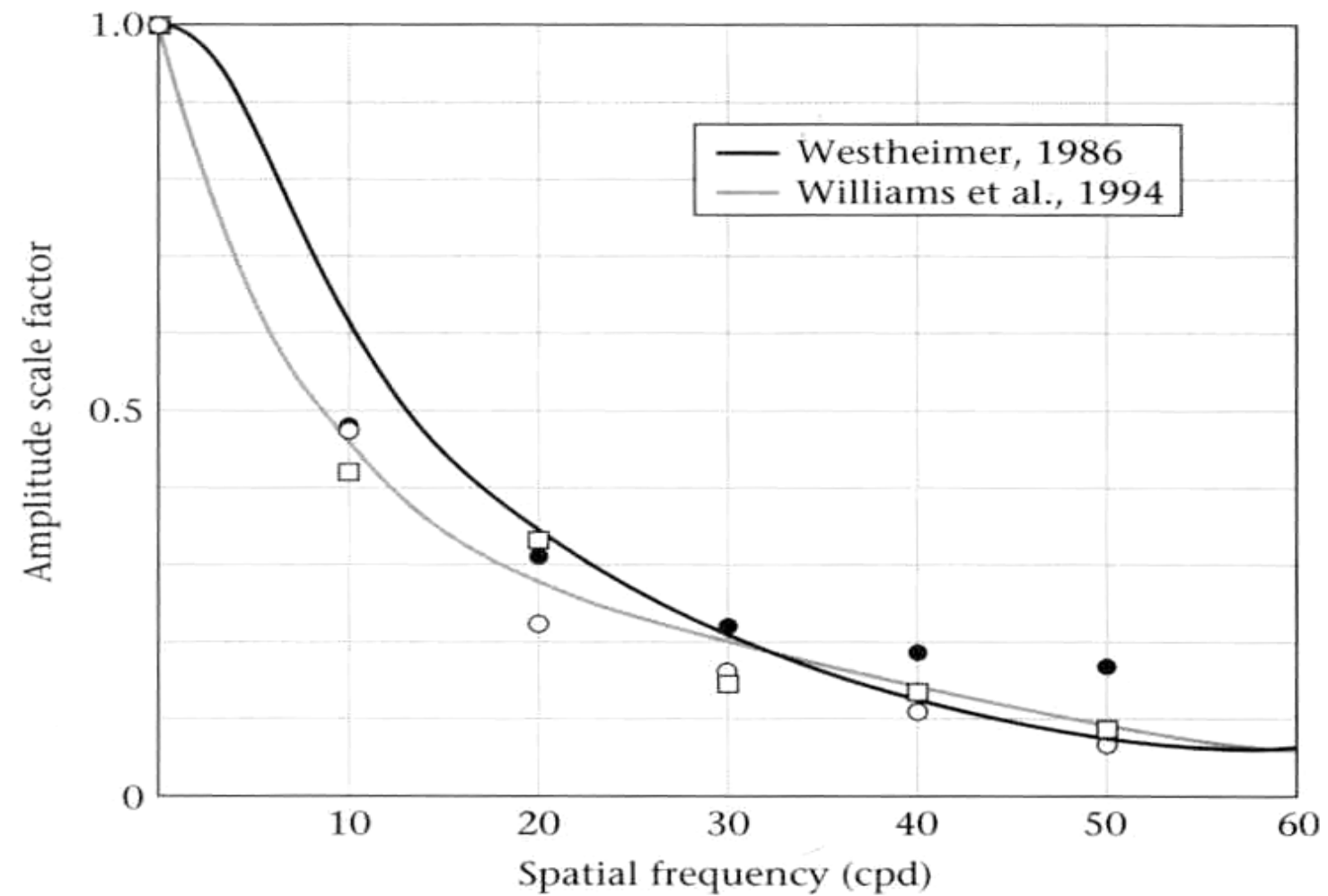


Pointspread function (PSF) & Astigmatism:

If the PSF is rotation symmetric, then there is no astigmatism



Modulation Transfer Function (MTF)



**Sine-wave
view of a
linear
system in
the Fourier
domain**