

# Viewpoint ▶ In Praise of the Unfused Crossed Cylinder

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## Introduction

Over the course of my thirty-two years of clinical optometric education, I have seen the Unfused Crossed Cylinder (UFCC) test relegated to obscurity in many clinical settings. When asked to explain the purpose or procedural rationale of the test, most optometric interns provide a somewhat nebulous answer. Typical replies include a disclaimer that they have had very little exposure to the test in their classroom studies. If pressed to give a more detailed response, the interns often state that the procedure is basically a monocular version of the Fused Crossed Cylinder (FCC) test. And with that, their explanation ceases.

Well, in light of the seemingly limited understanding of the test, this article is an attempt to bring it back into more reasonable utilization. This desire is driven by the fact that our upcoming generation of practitioners has not fully recognized the procedure's diagnostic significance and value.

Classically speaking, the UFCC is not a monocular version of the more commonly used FCC. Instead, it was originally conceived as a bi-ocular procedure involving the use of dissociating prisms. Most other technical aspects, however, are consistent with that of the FCC. The only variant is that at endpoint the data recording is made from the patient's dominant eye.

But what are the real commonalities and differences between the two tests? To begin with, both techniques are an attempt to measure the posture of accommodation when clarity of vision is not a factor. To this end, the tests are performed in dim light in an effort to minimize the influence of depth of focus. Additionally, the introduction of the crossed cylinders separates the accommodative meridians of the eye and further reduces the stimulus to attempt clear vision. Finally, the testing target consists of only lines and not acuity letters. In essence, every attempt is made to convey to the accommodative system, "When you don't have to see clearly, where do you like to hang out?"

The main difference between the tests is what we do with the convergence system. In the FCC, convergence is in play, while in the UFCC, it is not. In the unfused version, our attempt is to convey to the accommodative system, "When you don't have to see clearly ... AND when you don't even have to see one image ... where do you like to hang out?"

The usefulness of these two tests obviously comes about when they are performed in tandem. Collectively, the results allow us more accurately to define the status of the accommodative and convergence systems. For example, suppose a patient gives a net response of +1.75 D on the FCC. What might be some reasons for this response? One answer could be that the patient has a near point esophoria with low divergent

fusional reserves. In other words, the binocular dysfunction of convergence excess could be driving accommodation further from the testing plane of regard. Another response could be an accommodative insufficiency or, more specifically, presbyopia. Presbyopia would be most likely if the patient were in the 45- to 48-year-old age range. In a much younger patient, non-presbyopic accommodative insufficiency could be the suspected cause for the postural response.

If we eliminate the possibility of presbyopia by knowing that the patient is 22 years old, what is the reason for the FCC response? Is it convergence excess or accommodative insufficiency? The correct answer is...at this point we can't say with absolute certainty. This is where the UFCC becomes a significant additional test.

Suppose the patient also gives a net response of +1.75 D on the UFCC. The presence or absence of the convergence system had no apparent effect on the testing outcomes. Therefore, a diagnosis of accommodative insufficiency can be made.

Here is another example of how the two tests work synergistically to aid the clinician in an analysis of the visual system. Suppose a patient gives a net response of -0.25 D on the FCC. What might be some reasons for this response? One answer could be that the patient has a near point exophoria with low convergent fusional reserves. The binocular dysfunction of convergence insufficiency could be driving accommodation further inside the testing plane of regard. Keep in mind that if need be, the convergence system will always encourage the accommodative system to go where it has difficulty going itself. Another response, however, could be an accommodative excess or spasm of accommodation.

So which is it? Are we dealing with a presentation of convergence insufficiency or accommodative excess? Once again, the correct answer will be determined by the additional data provided by the UFCC. If the patient's response on the UFCC is a net of +0.75 D, then we conclude that the main problem is that of convergence insufficiency. That is because there is a significant difference in the outcomes of the two tests, with the convergence system apparently driving the accommodative response. In general, if the difference between the outcomes of the two tests is 0.75 D or more, convergence is deemed to be the most likely causative factor for the accommodative response.

We now see the significance of using both of these tests. There will be times in clinical practice when a patient's visual presentation may seem unclear. Is the problem rooted in accommodation or convergence? In times like those, we must not overlook the simple elegance of this testing duo. The insight we gain from these tests may well be the needed key to solving a patient's near point difficulties.

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