In-depth Analysis of MKH Methodology: From Fixation Disparity to Binocular Visual Information Balance—Valenz Test, Stereopsis Delay, and Prism Correction Strategies

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Date: 2025-04-27T21:39:24+00:00

Abstract

Mess-und Korrektionsmethodik nach Haase (MKH) is a unique system for managing binocular vision dysfunction associated with heterophoria, particularly fixation disparity (FD). Based on existing literature, this article systematically expounds the core theoretical framework of MKH and the key aspects of clinical practice. The content encompasses MKH' s understanding of fixation disparity, the adaptive mechanisms elicited by the visual system in response to persistent fixation disparity (including anomalous retinal correspondence and central suppression), the core detection tool—the Stereo-Dreiecktest (Stereo Triangle Test) and its underlying principle in revealing the phenomenon of stereopsis delay (Stereoverzogerung). It focuses on analyzing the crucial Valenz test (V-Test) in the MKH process, elaborately explaining its detection objective—achieving binocular visual information balance (Stereo-Sehgleichgewicht) or equivalence (Aquivalenz)—and its association with the phenomenon of sensory prevalence (Pravalenz). Furthermore, this article provides an in-depth introduction to MKH' s distinctive prism correction philosophy, particularly the precise, subjective feedback-dependent gradual prism adjustment strategy employed during the Valenz test phase. It aims to provide optometry professionals and researchers in related fields with a comprehensive review and interpretation of the theoretical essence, test procedure design, and correction logic of MKH.

Full Text

Preamble

MKH Methodology In-Depth Analysis: From Fixation Disparity to Binocular Visual Information Balance—The Valenz Test, Stereoscopic Delay, and Prism Correction Strategies

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April 27, 2025

The Mess- und Korrektionsmethodik nach Haase (MKH) is a unique system for managing binocular vision dysfunctions associated with heterophoria, particularly fixation disparity (FD). Based on existing literature, this paper systematically elaborates the core theoretical framework and key clinical practice components of MKH.

The content covers MKH' s understanding of fixation disparity, the adaptive mechanisms generated by the visual system when facing persistent fixation disparity (including anomalous retinal correspondence and central suppression), the core detection tool—the Stereo-Dreiecktest and its underlying principles for revealing the phenomenon of stereoscopic delay (Stereoverzögerung). The analysis focuses on the crucial Valenz test (V-Test) within the MKH protocol, explaining in detail its objective—achieving binocular visual information balance (Stereo-Sehgleichgewicht) or equivalence (Äquivalenz)—and its association with the phenomenon of prevalence (Prävalenz). Additionally, this paper provides an in-depth introduction to MKH' s distinctive prism correction philosophy, particularly the precise, subjective feedback-dependent gradual prism adjustment strategy employed during the Valenz test phase. The aim is to provide eye care professionals and related researchers with a comprehensive review and interpretation of MKH' s theoretical essence, test protocol design, and correction logic.

Keywords: MKH; Haase methodology; fixation disparity (FD); binocular vision; prism correction; Valenz test (V-Test); Stereo-Dreiecktest; stereoscopic delay; binocular visual information balance; equivalence (Äquivalenz); prevalence (Prävalenz); anomalous retinal correspondence (AC); central suppression; gradual prism adjustment

1 Introduction: Overview of MKH Methodology

The Mess- und Korrektionsmethodik nach Haase (MKH), developed by Hans-Joachim Haase, represents a widely applied paradigm for binocular vision examination and prism prescription in optometry, particularly in German-speaking countries [2]. This methodology specifically addresses functional problems arising from latent ocular misalignment (heterophoria), with fixation disparity (FD) as its central concept. Unlike traditional optometry, which primarily focuses on refractive errors, MKH posits that even extremely minute, persistent binocular fixation point deviations under normal fusion conditions may constitute the primary source of significant visual stress. However, some studies have questioned the reliability of MKH in detecting fixation disparity [4].

The fundamental objective of MKH is to qualitatively and quantitatively assess this functional binocular coordination deviation through a unique series of highly precise testing procedures that rely extensively on the subject's subjective reports. Based on these results, prisms are precisely prescribed to neutralize or "offset" the measured fixation disparity. Theoretically, by optically adjusting the light path through prisms, the retinal image points can be brought back into precise correspondence, thereby reducing or eliminating the additional neuromuscular load required to maintain fusion and ultimately alleviating visual stress to restore comfortable, stable, and efficient binocular visual function. The MKH examination protocol is hierarchical, typically beginning with relatively simple tests requiring low fusion demand (such as the cross test, Kreuztest) and progressively transitioning to more complex tests that simulate everyday visual environments with higher demands on central fusion and stereopsis (such as various FD tests, the Stereo-Dreiecktest, and ultimately the Valenz test, V-Test).

2 Core Theoretical Foundations of MKH

A thorough understanding of MKH' s various tests and correction logic requires grasping its unique theoretical foundations, which constitute the basis for MKH' s interpretation of visual phenomena and clinical decision-making.

2.1 Fixation Disparity (FD)—The Core Problem

MKH' s definition of fixation disparity differs in emphasis from traditional optometry. Rather than measuring ocular alignment under dissociated conditions (as in phoria testing), MKH emphasizes actual fixation accuracy under natural, associated fusion conditions. FD is defined as: when both eyes fixate on an object together and subjectively perceive a single clear image (implying the image falls within each eye' s Panum' s fusional area), the retinal image point in one eye (typically considered the functionally weaker or problematic eye) does not precisely project onto the fovea centralis—the retinal area of highest visual acuity—but instead exhibits a measurable minute spatial deviation [1]. Wick and London (2006) discussed sensory and motor approaches to fixation disparity analysis [7].

Within MKH' s theoretical framework, FD is viewed as a manifestation of visual system "decompensation," where the motor fusion system (the ability of extraocular muscles to compensate for ocular alignment deviations through fine coordinated movements) fails to completely and precisely overcome the underlying heterophoria. More importantly, MKH firmly believes that this persistent, even physiologically minute fixation error constitutes the direct physiological basis for the aforementioned visual stress and related symptoms.

2.2 Binocular Retinal Correspondence—Ideal vs. Reality

Binocular retinal correspondence forms the foundation for the visual system' s processing of spatial information. MKH pays particular attention to its functional status. The ideal state is bicentral correspondence (Bizentrale Korrespondenz), which represents the most physiologically ideal and functionally efficient binocular cooperation mode and serves as the functional goal of MKH correction. In this state, the foveas of both eyes form precise corresponding points in perceptual space, serving as the core for processing fine information in central vision. Bicentral correspondence is a necessary prerequisite for achieving the highest quality stereopsis, accurate spatial localization, and comfortable visual experience without strain.

In contrast, when facing long-standing, uncorrected fixation disparity, the visual system (particularly the cerebral cortex) may initiate complex sensory adaptation mechanisms to maintain hard-won binocular single vision and avoid troublesome confusion or diplopia. One important adaptation involves altering retinal correspondence relationships. The brain may functionally "recalibrate" such that the fovea of the dominant eye (typically the eye with more stable fixation) no longer corresponds functionally with the anatomical fovea of the other eye, but instead establishes a new functional correspondence with a disparate point on that retina—typically the area where the actual fixation disparity lands. This state is traditionally termed anomalous retinal correspondence (AC) in strabismusology, but MKH emphasizes its functional nature and reversibility. This means that when processing information from the deviating eye, this disparate point temporarily serves as a "pseudo-fovea," with its transmitted spatial direction value interpreted as "straight ahead."

2.3 Central Suppression—An Auxiliary Adaptive Mechanism

Beyond altering correspondence relationships, the visual system may employ another strategy to handle potential interference from fixation disparity. Even after functional correspondence changes, the anatomical fovea may still transmit the clearest image signal due to its highest photoreceptor density. However, this signal' s spatial position information may be "incorrect" under anomalous correspondence conditions and could conflict with information from the dominant eye' s fovea. To further reduce potential visual confusion, the brain may actively and selectively suppress neural signals from the central foveal region of the deviating eye. This central suppression phenomenon can be viewed as a price paid to maintain overall visual stability, which further impairs the ability of both foveas to work synergistically, limits the quality of fine stereopsis, and may cause specific perceptual phenomena in certain MKH tests (such as partial absence or blurring of central targets).

2.4 Haase' s "Visual System Dilemma"

H.-J. Haase vividly described the inherent conflict or "dilemma"the visual system faces when dealing with potential ocular alignment deviations. On one hand, there is the pursuit of precision versus energy conservation: employing full motor fusion reserves to precisely overcome ocular alignment deviations and maintain strict bicentral correspondence ensures optimal visual input quality (highest visual acuity, most precise stereopsis). However, this continuous neuromuscular activity consumes considerable physiological energy and may lead to fatigue and discomfort in individuals with large heterophoria or insufficient fusion reserves. On the other hand, there is the choice of adaptation: allowing a certain degree of fixation disparity without fully engaging motor fusion, instead relying on developing sensory adaptation mechanisms such as disparate correspondence and central suppression to maintain binocular single vision. This strategy is more economical in energy consumption but sacrifices some ideal binocular visual functions (such as decreased stereoscopic acuity, possible minute errors in spatial localization, and potentially slower or asymmetric responses to specific visual stimuli).

A core assumption of MKH is that many individuals complaining of asthenopia have visual systems that unconsciously tend toward this second "energy-saving but compromised"adaptive mode. Although this adaptation maintains binocular single vision in the short term, the cumulative effects of long-term functional deviation and suppression states ultimately lead to subjective discomfort and visual stress. MKH' s goal is to break this adaptive state through external prism intervention and guide the visual system back to (or toward) a more precise and balanced bicentral working mode.

3 Interpretation of Key MKH Tests

To investigate and quantify the specific manifestations of the aforementioned theoretical concepts in individuals, MKH has developed and relies on a series of specialized test targets and protocols.

3.1 Cross Test (Kreuztest)

This typically serves as the starting point of the MKH examination protocol. It uses a relatively simple target with low fusion demand (such as a cross) and asks the subject to judge whether vertical and horizontal lines align. This test primarily assesses whether obvious ocular alignment deviations exist and provides a baseline prism value (recorded as K+) to roughly neutralize the alignment deviation evident under low fusion load (primarily motor components). Kříž and Skorkovská (2017) investigated distance-associated heterophoria measured with the polarized cross test of the MKH method and its relationship to refractive error and age [5].

3.2 FD Tests (MKH FD-Tests: Zeiger-, Doppelzeiger-, Hakentest)

Compared to the cross test, these tests introduce more refined central fusion locking stimuli, such as a pointer that must be precisely aligned with the cross center (Zeigertest), two small dots that must be judged for coincidence (Doppelzeigertest), or a pair of hook-shaped marks that must be judged for alignment (Hakentest). These central details place higher demands on the stability and precision of the fusion system. By observing the subject' s subjective judgments about the relative positions of these central targets (is there offset? How much?), MKH aims to quantify the actual fixation disparity present in the central visual field. Alhassan et al. (2014) compared MKH-Haase charts with other commercially available heterophoria tests, examining their performance in measuring associated phoria [3].

3.3 Stereo Triangle Test (Stereo-Dreiecktest) and Stereoscopic Delay (Stereoverzögerung)

This test plays a crucial role in the MKH system for assessing stereoscopic visual function quality under dynamic conditions and the impact of sensory adaptation states.

3.3.1 Stimulus The core elements are a set (typically three) of small stereoscopic triangles and a reference target (such as a circle or simple background pattern). These triangles are given preset retinal disparity through specific dissociation techniques (most commonly linear polarizing filters, sometimes red-green complementary colors or time-multiplexed LCD shutter glasses). When both eyes successfully fuse these images, the disparity information is interpreted by the brain as depth, making the triangles appear to have three-dimensional positions in space—either clearly in front of (vorn) or behind (hinten) the reference target plane. Critically, front depth is typically induced by crossed/temporal disparity, while back depth is induced by uncrossed/nasal disparity.

3.3.2 Operation The core of the test protocol involves the examiner manipulating the device to achieve rapid, unpredictable switching between the two depth presentations (“front” and “back”). The subject’ s task is to verbally report, as quickly as possible after each switch, the perceived depth direction of the triangle (“now in front” or “now in back?”). The examiner records the reaction time and accuracy of each judgment.

3.3.3 Principle and Stereoscopic Delay (Stereoverzögerung) MKH theory provides an explanation for stereoscopic delay—the phenomenon where a subject’ s recognition speed for one specific depth direction (front or back) is significantly slower than the other—based on fixation disparity and asymmetric retinal imaging. The premise is the existence of fixation disparity (FD), meaning the retinal image point in the non-dominant eye does not fall precisely on the fovea. Because crossed and uncrossed disparity create different stimulation patterns on the retina, when presenting front depth (crossed disparity) or back depth (uncrossed disparity), the specific landing position of the stereoscopic object’ s image on the non-dominant eye’ s retina differs relative to its fovea (or adapted functional center).

This leads to differential fusion load and processing efficiency. In an unfavorable situation, if a certain type of disparity (for example, crossed disparity is typically considered more unfavorable for individuals with exo-fixation disparity according to MKH theory) causes the image point to land relatively far from the (adapted) functional correspondence center, or in a retinal region affected by central suppression, the brain must expend more neural computational effort and time to integrate binocular information, calculate depth, and finally form stable stereoscopic perception. This process may also involve very minute eye movements attempting to compensate for the deviation (Mikrovergenz), all of which increase reaction time. Conversely, in a favorable situation, if another type of disparity (for example, uncrossed disparity is typically considered more favorable for exo-FD individuals) causes the image point to land closer to the functional correspondence center and in a less suppressed region, the fusion process of binocular information becomes smoother, faster, and requires fewer neural resources, sometimes making subjects feel that depth appears "spontaneously" or "immediately."

These differences in fusion processing efficiency between favorable and unfavorable situations ultimately manifest as the subject' s obvious delay in perceiving the "unfavorable" depth direction. They may report that "that direction appears slower," "I have to think to see whether it' s front or back," or "I can' t react in time." This delay is regarded by MKH as a direct reflection of fixation disparity and its sensory adaptation consequences in dynamic stereoscopic visual tasks. Therefore, eliminating or significantly reducing this directional difference in perception speed represents an important goal in MKH prism correction, typically requiring specific prism correction steps recorded as St+ through the stereo triangle test.

3.4 Valenz Test (V-Test)—The Pursuit of Final Balance

The Valenz test (etymologically related to "value" or "valence," assessing the relative "value" of binocular information input) typically serves as the final and most challenging and decisive test in the MKH examination protocol. It inherits the stereo triangle test' s focus on depth perception speed but places greater emphasis on assessing whether the subject' s subjective spatial localization of stereoscopic objects is precisely centered under both depth presentations.

3.4.1 Stimulus The stimulus is essentially the same as in the stereo triangle test, featuring stereoscopic figures (such as triangles) that can generate front (crossed disparity) and back (uncrossed disparity) depth, accompanied by a central reference point or structure.

3.4.2 Operation Rapid, unpredictable switching between "front" and "back" depth presentations is performed similarly to the stereo triangle test.

3.4.3 Core Task This is the key distinction between the Valenz test and the stereo triangle test. Subjects must not only judge depth direction but, more importantly, precisely determine the position of the perceived stereoscopic figure (typically the indicative tip, such as the triangle vertex) relative to the central reference point: is it exactly in the middle (mittig), or does it appear shifted to the left (links) or right (rechts)? This localization judgment must be independently completed and reported for both presentation modes (front and back).

3.4.4 Principle and Conceptual Interpretation The Valenz test aims to probe the deepest level of functional adaptation and assess whether current prism correction is sufficient to restore true binocular information processing symmetry. Binocular visual information balance (Stereo-Sehgleichgewicht) or equivalence (Äquivalenz) is the ultimate ideal result pursued by the Valenz test. When subjects consistently report that the perceived spatial position of the stereoscopic figure is unbiased and precisely centered, regardless of whether it appears in front or back, this state is considered achieved. MKH interprets this state as having extremely high functional significance, typically explained as: (a) functional bicentral correspondence has been successfully restored or was originally functioning effectively, allowing the brain to integrate signals from both foveas as having equal spatial value without bias; (b) the visual system can symmetrically and with equal quality process both basic depth information types—crossed and uncrossed disparity—and accurately localize them on the perceptual space' s central axis; (c) previously existing central suppression and functional anomalous correspondence triggered by fixation disparity have been effectively neutralized or eliminated as interfering factors for this precise stereoscopic spatial localization task; and (d) in MKH practice, achieving Äquivalenz is typically regarded as the most important and final indicator that prism correction has reached its functional "complete" state (Vollkorrektion).

Conversely, imbalance (Ungleichgewicht) or prevalence (Prävalenz) occurs when subjects report that in at least one presentation mode (front or back, or both), the perceived position of the stereoscopic figure clearly deviates from center (for example, "the front one is left-shifted, the back one is centered," or "both are right-shifted"). This is interpreted as a clear signal that functional sensory adaptation mechanisms (disparate correspondence, central suppression) remain actively influencing the subject' s spatial perception judgments. The visual system exhibits functional asymmetry when processing crossed and uncrossed disparity. The specific direction and degree of deviation reveal which eye' s input information or which disparity processing pathway functionally dominates ("prevails") under current visual conditions (including existing prism correction). This perceptual imbalance clearly indicates that current prism correction has not yet fully or functionally eliminated the deep sensory adaptation effects triggered by fixation disparity.

4 MKH Fixation Disparity Subtypes (FD-Unterarten)

To better describe and communicate different manifestations of fixation disparity and their correction difficulty in clinical practice, MKH proposes a classification system based on the required testing level. It must be emphasized that the scientific rigor and universal recognition of this classification system remain controversial, but among practitioners following the MKH method, it provides a standardized descriptive language [4].

- **FD I**: Only the cross test (Kreuztest) is needed to determine the baseline prism value (K+), which can then make all subsequent FD tests (such as Zeiger-, Doppelzeiger-, Hakentest) achieve ideal zero perception. MKH theory tends to attribute this type primarily to insufficient motor fusion compensation, suggesting that functional bicentral correspondence remains essentially intact.
- **FD II, 1**: K+ prism alone is insufficient to completely correct perceptual offsets in FD tests (Z, DZ, H). Additional Z+/DZ+/H+ prism values must be superimposed to make these centrally demanding FD tests reach zero, and (typically) to achieve ideal performance on basic stereoscopic tests (such as the D6 test, not the Valenz test), for example, recognizing 30 arcseconds without obvious delay. This is interpreted as indicating deeper sensory adaptation related to central fusion mechanisms.
- **FD II, 2**: Even after completing all prism corrections required for FD I and FD II, 1 stages (i.e., using K+, Z+, DZ+, H+), subjects still show obvious directional stereoscopic delay during the stereo triangle test. This indicates more stubborn sensory adaptation specifically affecting dynamic stereoscopic visual processing speed. Eliminating this delay requires specialized prism correction steps, namely St+.
- **FD II, 3**: This is the deepest and reportedly rarest type. Subjects may have passed all previous test corrections (K+, Z+, DZ+, H+, St+), with seemingly ideal indicators and eliminated stereoscopic delay, yet still show perceptual position imbalance (Prävalenz) in the final Valenz test, unable to achieve Äquivalenz. This is considered the deepest manifestation of functional correspondence anomalies or central suppression, requiring final prism fine-tuning based on Valenz test feedback (V-step) to achieve ultimate binocular visual information balance.

5 MKH Prism Correction Strategy: Stepwise Fine Adjustment

Simonsz et al. (2001) compared prism prescription methods using the MKH approach versus conventional orthoptic examination, finding differences in effectiveness [6]. MKH' s prism prescription process is not accomplished in one step but rather represents a hierarchical, progressive, and highly subject-dependent fine-tuning process that relies extensively on the subject' s subjective reports throughout each testing phase. Its core objective is to compensate for fixation disparity through prisms, functionally "release" sensory adaptation, and ultimately guide the visual system toward the balance defined by the Valenz test.

5.1 Logic of Correction Sequence

Typically, prism superimposition follows the order of MKH tests, which is considered to progress from handling more peripheral, lower fusion demand deviations to addressing central, higher fusion demand deviations related to dynamic and fine stereoscopic vision:

1. **K+ (based on cross test)**: Determine baseline prism value through the cross test to neutralize ocular alignment deviation under low fusion load, typically dominated by motor components [5].
2. **Z+/DZ+/H+ (based on FD tests)**: Based on the pointer test (Zeigertest), double pointer test (Doppelzeigertest), and hook test (Hakentest), further quantify fixation disparity in central vision and adjust prisms to eliminate perceptual offset, targeting deeper sensory deviations [3].
3. **St+ (based on stereo triangle test)**: Eliminate stereoscopic delay through the stereo triangle test to ensure symmetric processing speed of dynamic stereoscopic vision, addressing stubborn sensory adaptation.
4. **V (based on Valenz test)**: Finally, fine-tune prisms through the Valenz test to eliminate perceptual position imbalance (Prävalenz), achieve binocular visual information balance (Äquivalenz), and realize functional bicentral correspondence [7].

5.2 Operational Guidelines for Prism Adjustment During Valenz Test

This is the most refined and critical step in the MKH correction protocol, aiming to eliminate perceptual position imbalance (Prävalenz) and ultimately achieve binocular visual information balance (Äquivalenz) through fine prism adjustments. The detailed operational steps are as follows:

1. **Initial State Assessment**: The subject wears a trial frame with cumulative prism correction values determined through all previous test steps (K+, Z+/DZ+/H+, St+). The examiner initiates the Valenz test equipment, preparing for rapid, unpredictable switching between "front"(crossed disparity) and "back" (uncrossed disparity) depth presentations.
2. **Record Initial Subjective Perception**: The examiner carefully inquires and records the subject' s perceived position of the stereoscopic figure (such as triangle tip) relative to the central reference point under both depth presentations: "Is it exactly in the center, or shifted left or right?" Simultaneously record any obvious stereoscopic delay phenomena, such as the subject reporting that depth perception in one direction is "slower" or "requires thinking to judge."
3. **Core Objective: Eliminate Imbalance (Prävalenz) and Achieve Balance (Äquivalenz)**: The examiner gradually adjusts prisms through the following sub-steps to eliminate perceptual position imbalance:

- **Identify Imbalance Pattern**: Accurately determine in which depth presentation (front, back, or both) the perceived position deviates from center and the specific direction (left or right). For example, the subject may report "the front figure is left-shifted, the back figure is centered" or "both are right-shifted." This information indicates the direction and degree of functional asymmetry in the current visual system.
- **Apply Minute Trial Prisms**: Based on MKH clinical judgment rules (typically based on experience and training), gradually add or subtract minute prism amounts before one eye, usually in 0.25 prism diopter steps, with horizontal or vertical base directions. The prism base direction should be designed to move the subject' s subjective perception toward center. For example, if the front figure is left-shifted, one might attempt adding base-out prism before the non-dominant eye to correct the perceptual offset.
- **Continuous Iteration and Bidirectional Feedback**: After each prism adjustment, immediately repeat the Valenz test with rapid switching between front and back depth presentations, and again inquire about perceived positions in both modes. The examiner must patiently search for the prism value that makes the subject report both front and back figures as closest to or exactly at center. This process may require multiple fine adjustments to gradually approach the optimal value.
- **Find Optimal Balance/Compromise Point**: Due to the complexity of the binocular visual system, adjusting prisms to improve localization in one direction may slightly affect the other direction. Therefore, the examiner must find the optimal balance point between the two depth presentations, minimizing perceptual imbalance in both, ideally achieving Äquivalenz (both perceived as central).
- **Simultaneously Observe Delay Changes**: While adjusting localization, continuously monitor stereoscopic delay phenomena. Ideally, any residual stereoscopic delay should also lessen or disappear as perceptual position approaches balance, serving as an auxiliary verification indicator of correction effectiveness.

4. **Confirm Endpoint Stability (Bracketing Technique)**: When a prism value seemingly achieving Äquivalenz is found, the examiner confirms it through slight "over-correction" and "under-correction" (e.g., adding/subtracting 0.25 pdpt), asking the subject which state feels most comfortable, clearest, and most stable. This technique ensures the selected prism value is at the center of the optimal range.

5. **Determine Final Prism Correction Value**: The prism value (or cumulative prism value) that can stably establish "binocular visual information balance" (Äquivalenz) with minimal (or no) stereoscopic delay during the Valenz test is determined as the final functional correction prism power. This value will be used in the final spectacle prescription to ensure optimal

binocular coordination in daily use.

6 Summary and Discussion

The MKH methodology undoubtedly provides a unique and extremely detailed perspective for examining and managing binocular vision problems related to fixation disparity in optometry. It profoundly reveals complex and covert sensory adaptation phenomena that the visual system may develop when facing persistent binocular coordination challenges, such as functional anomalous retinal correspondence and central suppression, and considers these adaptive mechanisms as key, intervenable pathophysiological factors underlying the widely prevalent symptom of asthenopia (what MKH terms “visual stress”).

The methodology’ s core detection tools, particularly the stereo triangle test and its ability to reveal stereoscopic delay phenomena, along with the Valenz test as the key to final evaluation and adjustment and the relentless pursuit of binocular visual information balance (Äquivalenz), collectively constitute the essence of MKH’ s diagnostic logic and correction protocol. These tests aim not merely to quantify a static functional deviation value but, more deeply, to detect and attempt to “release” or “rebalance” the deep sensory adaptation patterns that the visual system spontaneously establishes to maintain binocular single vision but which may have side effects, through external physical intervention with prisms.

MKH’ s prism correction strategy also significantly differs from many traditional approaches. Rather than simply prescribing compensatory prisms based on measured heterophoria angles or fusion reserve capacity, it employs a dynamic, hierarchical, highly individualized, and extremely subject-dependent gradual fine-tuning method that relies on continuous, accurate subjective feedback throughout the testing process. Particularly the operation during the Valenz test phase fully embodies MKH’ s unique concept of finding the precise prism stimulus value that can functionally “recalibrate” binocular information processing pathways, enabling the brain to process both basic depth cues (crossed and uncrossed disparity) with equal effectiveness.

However, while fully acknowledging the meticulousness, systematicity, and potential benefits of MKH methodology for specific patient populations in clinical practice, we must also objectively recognize the widespread controversies and challenges this system faces in the international optometric academic community. Its core theoretical assumptions (for example, that fixation disparity is a major and universal cause of asthenopia, the degree of reversibility of sensory adaptation, and the specific neurophysiological mechanisms of prism correction) still largely lack universal support from high-quality scientific evidence from independent third parties using rigorous research designs (such as randomized controlled trials) [4]. Interpretation of its test results heavily depends on MKH’ s own theoretical closed loop, and sometimes its inferences have certain theoretical tensions with other established principles of vision science that require further clarification. Therefore, MKH' s overall effectiveness, result reproducibility, and conclusion generalizability remain important topics for ongoing academic discussion and research in optometry [6].

Despite these controversies, for clinicians who have undergone systematic MKH training and strictly follow its complex operational protocols, this method undoubtedly provides a standardized workflow and solution for managing specific types of vision-function-related complaints, especially those that traditional examination methods may struggle to effectively identify or resolve. At the clinical practice level, numerous case reports from these practitioners claim successful significant relief of long-term asthenopia symptoms in patients through the MKH method [5].

Ultimately, regardless of which vision function assessment and correction system clinicians choose to follow, certain fundamental principles are universal and crucial: conducting comprehensive ocular health examinations and refractive status assessments; performing detailed, thorough binocular vision function examinations ideally combining objective measurements with subjective results; conducting in-depth history taking to fully understand the patient' s complaints, visual needs, and living/working environment; and most importantly, establishing a trusting relationship with patients for clear, honest, two-way communication to jointly develop visual correction and management plans most suitable for individual needs. A deep understanding of MKH methodology principles and practice, whether or not fully adopted, helps broaden our recognition of the complexity of binocular vision function abnormalities and enriches the assessment and management strategies available in our clinical toolbox.

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