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Random Retinal Imagery

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Abstract

In an earlier paper, the statistical case was made for the impossibility of the human visual system (eye and brain) to have organized itself by random-chance evolutionary processes. The "data connections" between the eye's retina and the brain that must be correctly correlated in order to produce an excellent image of a scene require a Designer to implement a system that obeys the laws of optics for correct object-image mapping. This paper builds on that earlier paper to illustrate randomly generated imagery for a number of object scenes, including randomness levels from 0% to 100%, and draws some conclusions about what we should be seeing with our visual system if evolutionary processes were the creative agent. God has provided the human stereo visual system, along with millions of other created visual systems in nature, to offer His testimony of miraculous Creation.

Introduction

A decade ago the author presented a statistical basis for the conclusion that random-chance evolutionary processes cannot possibly account for the image formation and the image sampling that takes place in the human visual system (Stoltzmann, 2006). The object-image mapping process that the eye and brain accomplish involves millions of retinal receptors that must be "wired" correctly in order for excellent vision to take place, and no random process can accomplish this task. To investigate this further, this paper presents simulated imagery in various stages of randomness to illustrate what level of image quality we could expect to witness if our visual system were randomly assembled.

In 2005 the author presented a paper to the International Society for Optics and Photonics (formerly known as the Society of Photo-optical Instrumentation Engineers, or SPIE) detailing the statistics of randomly assembled visual systems (Stoltzmann, 2005), and the results of that paper were later published in the *Creation Research Society Quarterly* (CRSQ; Stoltzmann, 2006). An evolutionist at this conference was quite displeased with the presentation and told the author, "We get the correct wiring for the eye at birth, and that was all that was needed to be said about the subject." This testifies to the closed-minded nature of even the most educated people who are involved with detailed research, when God is rejected outright and only natural processes are allowed to offer answers. Over the past decade, the original SPIE paper and the CRSQ paper have been offered to many evolutionary-minded people, asking each of them to refute the statistics and the mathematics presented in the paper. None have done that, although many evolutionary sermons have been preached in lieu of a refutation being given. The simple conclusion is that the

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best evolutionary scientists cannot offer an explanation of how the visual system gets mapped and interpreted correctly in the brain, supposedly by chance.

Investigating Random Imagery

To begin, let us take a look at Figure 1 from the decade-old SPIE article (Stoltzmann, 2005), which is also Figure 2 of the CRSQ article (Stoltzmann, 2006). Figure 1(b) shows one of the 2500 factorial ($2500! = 10^{7,411}$) possible rearrangements or permutations of the 50 by 50 pixel array that represents the object scene of Figure 1(a), namely a small portion of a topo map.

A colleague (see acknowledgments) wrote a computer program that will take a digital image and process that image to randomize the pixels such that any level of randomization can be selected by the user. The process simply applies a random generator function to the array of pixels in an image and relocates a user-specified level of pixels (0–100%) to other parts of the image, randomly, while putting the replaced pixel contents in the place where the original pixel was before randomization. There is no "noise" being introduced, even though the gray-scale images in this paper appear to have noise as a result. Applying that program to the image of Figure 1(a), the randomized images of Figure 2 are obtained when the level of randomization is selected, in this case to range from 50% to 99%. At approximately 80% randomization, a faint "Well" and "22" can still be seen as almost "ghost details" hidden within a background of noise. Randomization levels higher than 80% yield essentially images of complete noise where none of the original image detail can be discerned.

Some Statistics

In the 2006 CRSQ paper, the statistics showed that for the retina to have a large number of correctly connected rods and cones (i.e., these receptors are correctly mapped in the sense that a camera lens does this same function), the result for random connections is that the percentage of correct connections diminishes rapidly as the desired number of correct connections (M) increases (Stoltzmann, 2006). The percentage of correctly connected receptors is given by: 36.78794/M! percent. As M increases, M! (M factorial) in the denominator increases exponentially, resulting in a pixilated field of view (FOV) wherein very few of the pixels are correctly wired. No matter how many pixels or receptors there are in the FOV, the percentage of correctly connected pixels remains fixed at 36.78794/M! percent. For a large number of pixels, the net result is that there are possibly a few correctly connected pixels, but they are lost within a huge ocean of incorrect connections. The visual system ultimately cannot tell which pixels are correctly wired and which are not, because the image looks like noise for the most part. This is what is illustrated at about the 80% randomization level shown in the images of Figure 2.

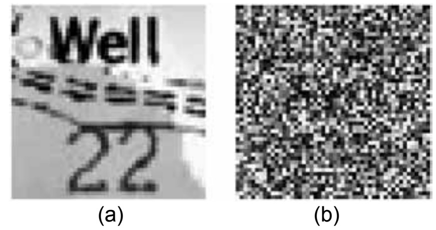

Figure 1. 50 x 50-pixel image of a small section of a topographic map. The correctly digitized (scanned) image is shown in (a), while the scrambled pixels shown in (b) represent one redistribution of the 2500! (1.63×10^{7411}) possible permutations of the pixels for this image. 50 x 50 pixels is roughly 1/6th of the foveal FOV for human eyes.

An 80% randomization level might seem like a huge "penalty" to the image, wherein 4/5 of the image is degraded by the randomization process. The previous papers showed that regardless of the number of pixels in a given FOV,

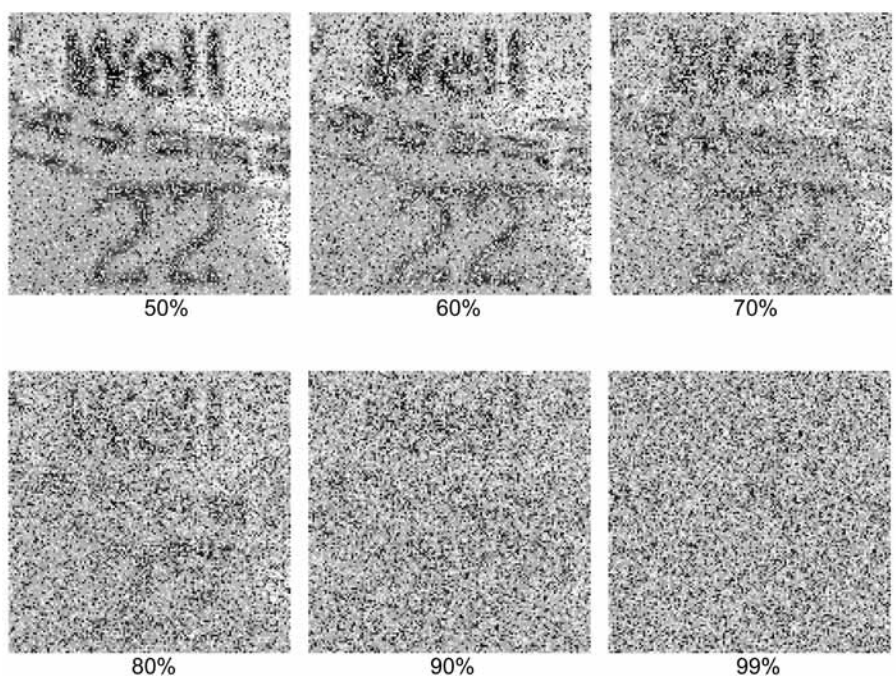

Figure 2. The pixels of Fig 1(a) have been randomized at various levels, indicated by the percentages.

if the requirement is arbitrarily that 6 or more pixels are needed to be mapped correctly, 99.9% of all the combinations of random connections are incorrect wirings, and less than 0.1% of the random wiring attempts will have 6 or more pixels connected correctly (Stoltzmann, 2005, 2006). This is a staggering concept for random-chance image formation in an eye or visual system. If the various images of Figure 2 were to represent the fovea of the human visual system, there would be approximately 125 x 125 pixels in the images, or about 15,000 total pixels, and 99.9% of the rearrangements of these 15,000 pixels will deliver fewer than 6 pixels that are correctly connected, compared to the Figure 2 example of 80% incorrectly connected pixels and 20% (3000 pixels) correctly connected. Yet an 80% randomization level appears to look like noise across the full FOV. The simple conclusion is that asking for only 20% of the visual field to be mapped or connected correctly is completely impossible by random chance, and in reality less than 0.1% of the time we will get 6 or more pixels having correct connections. Random chance will give an image not unlike what is shown for the 99% randomization image of Figure 2; that is, complete noise with no detail at all.

This conclusion can be framed another way. One (1) of the large set of 100% randomized images will look exactly like the original image, and the challenge for evolution is for the visual system to assemble that one (1) perfect image, just like what normal humans see every day. For the 50 x 50 pixel array of Figure 1(a), evolution will have to try 2500! permutations, or $10^{7,411}$ possibilities. And this is just 1/6 of the foveal FOV, which is not even close to the 126 million rods and cones that have to be correctly connected. If the number of pixels were only 12 (a simple 3 x 4 array), evolution "only" has to try 12 factorial (12! = 479,001,600) possibilities to get a perfect image. That is, evolution has to try half a billion attempts to get 12 simple pixels wired correctly. This is the problem evolution has to somehow overcome to obtain the human visual system, using only random changes to the retinal makeup. Evolution just cannot work with this kind of complexity.

As another example of randomized imagery, Figure 3 examines the visual appearance of a 2D (two-dimensional) barcode array, often referred to as a QR code, with its three corners of squares used for orientation and alignment. The individual images in Figure 3 have 34 x 34 pixels, and the images are binary in the sense that either a pixel is completely black or completely white. As the randomization progresses from 0% to 100%, the number of black pixels and white pixels remains the same, and the images still resemble barcodes, but the thing to notice is how the original information for the three alignment squares disappears with increased randomization. At a randomization level of 50% or higher, the squares are lost in the scrambled array of pixels.

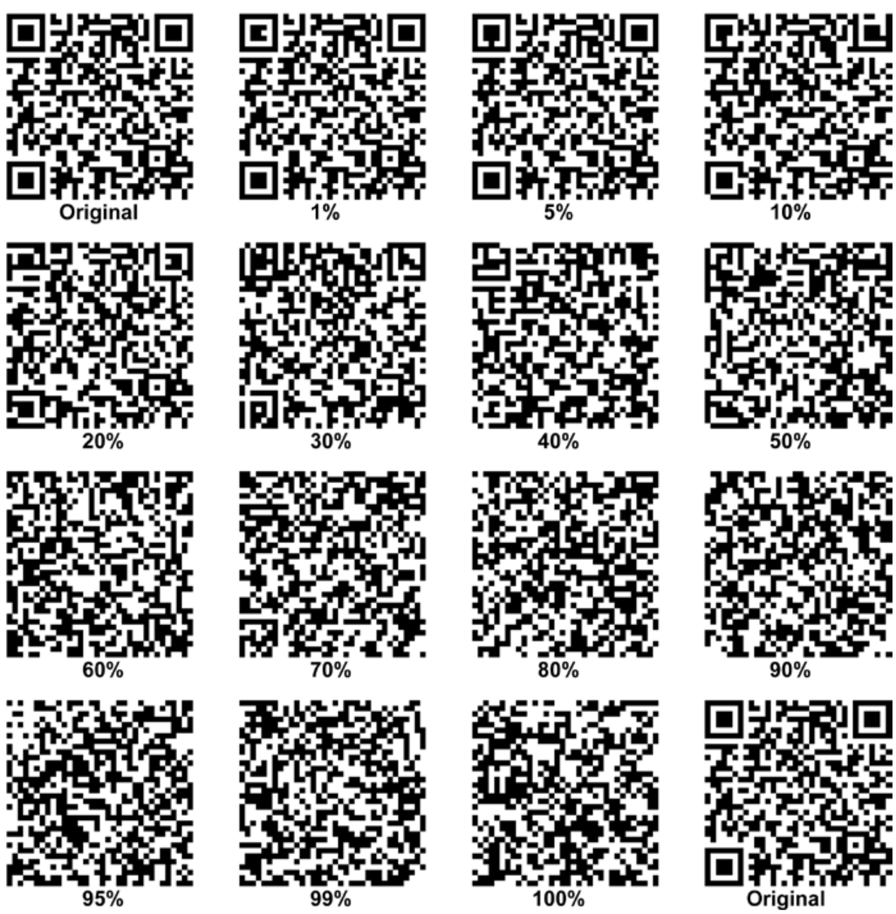

Figure 3. A 2D (2-dimensional) barcode pattern with 34 x 34 pixels is shown in various stages of randomization. At levels above 50% randomization, almost all of the three corner-orientation squares are lost for this approximate QR code example of a barcode.

Noise in the Image

Some interesting artifacts appear when randomization is applied to a normal photograph of a face. Figure 4 illustrates that even with low randomization levels, noise in the image appears and is visually disturbing. Above 80% randomization all details of the face are lost in the noise,

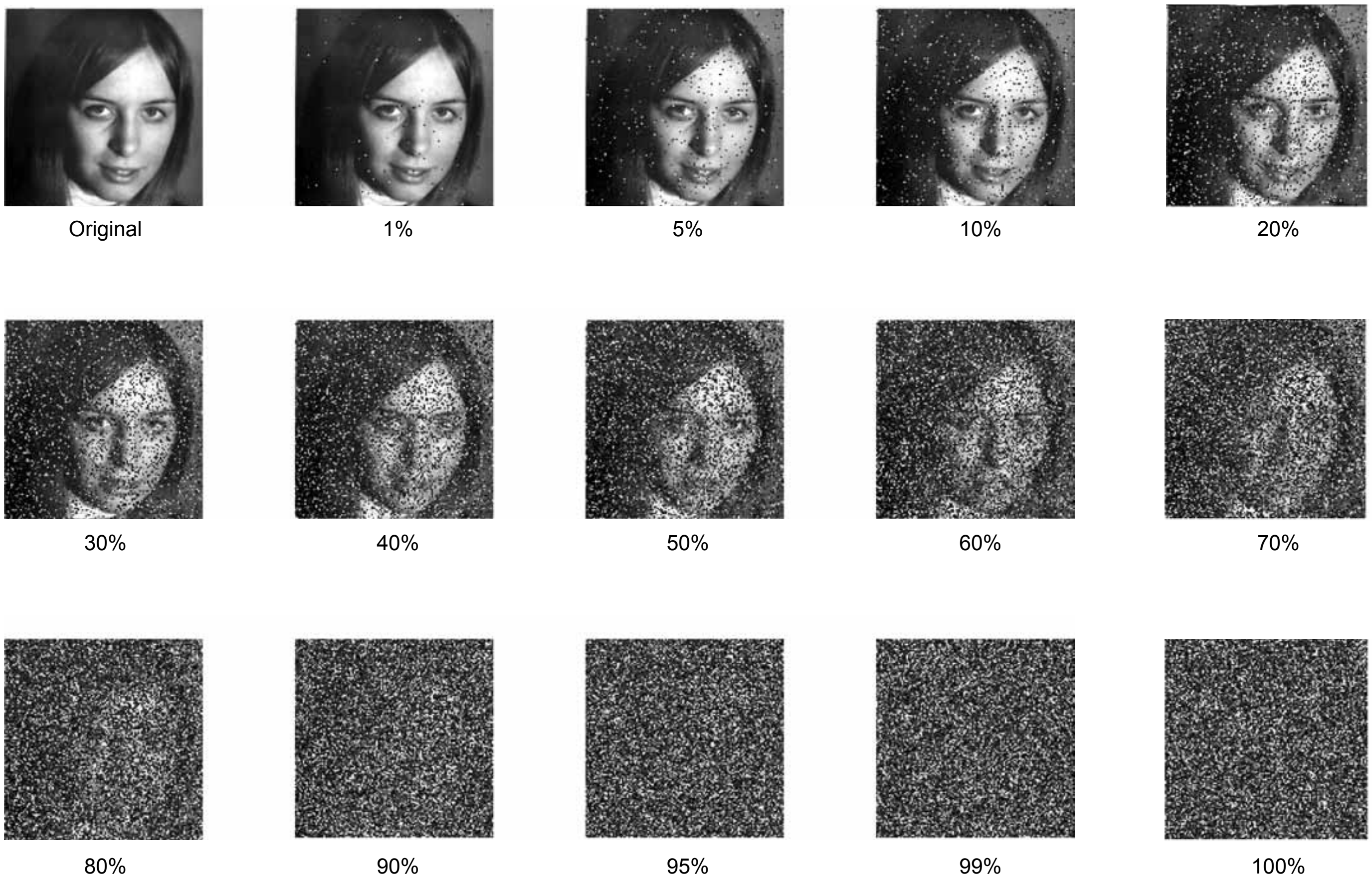

Figure 4. An actual photo of a face is used as the image, which gets degraded by increasing levels of randomization. In evolutionary terms, one could consider this an example of what a "primitive" eye-brain visual system might deliver if not all of the rods and cones are hooked up correctly. Each image is represented by 125 x 125 pixels, similar to the ~15,000 photoreceptors of the human fovea. Above 80% randomization, nothing in the FOV is discernable as detail. Random-chance connections would deliver imagery somewhere between the images represented by the 99% and 100% randomization levels.

but even at 5–10% randomization the noise is pronounced. One might ask how evolutionary processes have eliminated the noise even in the low randomization images? That is, why is there no additional random noise to remove from the human visual system when random processes are the only ones allowed to be used to even get an image? How has evolution been able to perfectly "peak" the visual system and leave no noise?

The use of the word "noise" in this paper should be clarified. Visually, the randomization process for altering the images appears to inject "noise" into the image, in the case of gray-scale or color images. In fact, there is no noise being introduced, but rather a reassignment of some of the original pixels to other locations in the image. Even though the reassigned pixels appear to be out of place and appear visually like noise, in fact their gray-scale or color content has been preserved, and only the locations of the random pixels have been changed. In the case of a video presentation of the randomly reordered pixels, a "fixed-pattern noise" appears to be evident in the altered video, and this pattern can be observed to track with the panning motion of the camera, indicating that each frame of the video has the same random change applied to it rather than some true random "noise" ending up within each video frame.

Troubles for Evolution

Noise in a visual image is a real problem for evolution. If the human visual system had noisy imagery as a result of evolution still trying to "work" with the natural selection process to improve the images, that would be a very powerful claim that evolution has developed the visual system. But those random connections that are incorrect and produce the noise are not to be found with the normal human visual system. That seals the case for creation and a God who has designed the visual system to be very pleasing to the sighted human being. If the visual system had arbitrarily about 10% randomization errors, that imagery would not preclude humans from hunting/gathering or living a full life with "slightly" degraded eyesight. So why has evolution not left us with less than perfect vision? What makes random chance so powerful with its claimed ability to create incredibly peaked living organisms? The simple answer is that God must provide the miracle of life and the information that peaks the living matter of His creation. And in the end, if evolution is still working on removing the final 10% randomization in this example we have been discussing, how does further random alteration of the 10% degraded imagery remove the incorrectly wired pixels and not alter the good pixels instead? Natural selection provides no guarantee that altering a given system will improve the results, and that certainly is the case when it comes to the wiring of the eye-brain system. If you doubt this, just try randomly altering your TV screen pixels, or your digital camera pixels, and see if you can improve the imagery.

As another example of noise in an image from miswirings, Figure 5 presents randomized images of text, where there are initially individual regions of black and white pixels that get increasingly scrambled. The selected text is Figure 9 and its caption from the original SPIE paper (Stoltzmann, 2005). Such imagery is very unforgiving when it comes to having noise in the image caused by incorrect wirings. Even though some text can be discerned at the 80% randomization level, the random noise dominates the imagery. At a 10% level or higher there is ample noise showing up, testifying that our visual system is not plagued with such randomization errors.

Figures 4 and 5 clearly address a substantial problem with evolutionary processes. Two human eyes represent an almost perfect object-to-image mapping, where each rod and cone is wired correctly in each eye, and the stereo overlap of the imagery from both eyes is perfectly matched too. A normal human visual system does not show the "background noise" that Figures 4 and 5 depict, where some of the eye-to-brain connections are incorrect. For example, when viewing a brightly lit TV screen in a dimly lit room, we do not experience a random-noise background around the periphery of the TV screen, caused by incorrectly wired receptors. Even a few percent of image randomness would be perceptible, and quite annoying. So, how could random-chance, purposeless, undirected processes have created a visual system that shows no such random wiring errors? If evolution were true, we would expect that some level of random noise would be seen, not unlike looking through a somewhat dirty window. But what the actual human visual system provides with each eye is a noise-free view of the world, an incredible concept in and of itself, considering all of the connections involved.

A "Very Good" Visual System

Our visual system is not randomly assembled in some long, drawn-out, trial-and-error process of natural selection. It shows full evidence of a Creator who pronounced His creation "very good" (Genesis 1:31). No consumer would purchase a digital camera that had 10% randomly and incorrectly connected pixels in the imagery produced by the camera, and that consumer would certainly not pronounce that camera "very good." Only God can program our DNA to allow for a "very good" visual system to speak to His creative powers. We live in a time where such scientific evidence abounds in every field, and we are definitely without excuse in this regard. The human visual system alone should be all that is needed to convince an open mind willing to listen to the evidence. Even Darwin contemplated the extreme difficulties associated with the human visual system, but he still argued that given enough time and enough small perturbations, an eye could have developed gradually to be what we have today with the visual system. Darwin did not address the complexities involved with the "wiring" of the visual system, and well over a century later evolutionists still do not have an explanation for how the 126 million rods and cones of a single eye are correctly connected to the brain.

The simplistic evolutionary statements that a single eye spot eventually turns into two eye spots, and then more eye spots, to eventually develop into a complex retina, do not convince anyone of the truth of that claimed process. The message is clear from the statistics of random wiring of a visual system: It is absolutely impossible to produce any meaningful level of correct connections in the visual system by random chance. As the original SPIE paper (Stoltzmann, 2005) illustrated a decade ago, in any image, getting more than say 6 correct connections (pixels or rods or cones) leaves 99.9% of the rest of the attempts at 6 correct connections as incorrectly connected images. Even the 99% randomized images shown in the previous figures do not come close to representing the level of incorrect connections from random processes. 6 pixels out of the 570,000 pixels that make up the images of Figure 5 represent 0.001% of the FOV, and it would be impossible to find those 6 pixels in the noise of incorrectly connected pixels. To any evolutionist who is still unconvinced, the challenge is to demonstrate how random processes can achieve perfect vision, first in one eye, and then with two eyes that have perfectly correlated FOVs for stereovision. This very question has been posed to many evolutionists over the past decade since the SPIE and the

Figure 5. A larger FOV (1140H x 500V Pixels, or about 36 times the area of the fovea) is depicted with increasing levels of randomization. Figure 9 from the SPIE paper (Stoltzmann, 2005) was used as the text image for randomization. Note how even with a few percent of the image being randomized, background noise shows up in the formerly clear portions of the image. The main reason some faint text can still be discerned in the 80% randomization level image is because of the greater number of pixels used (a higher sampling level of the image) in this example (1140 x 500 instead of 125 x 125 or 50 x 50 used in previous figures).

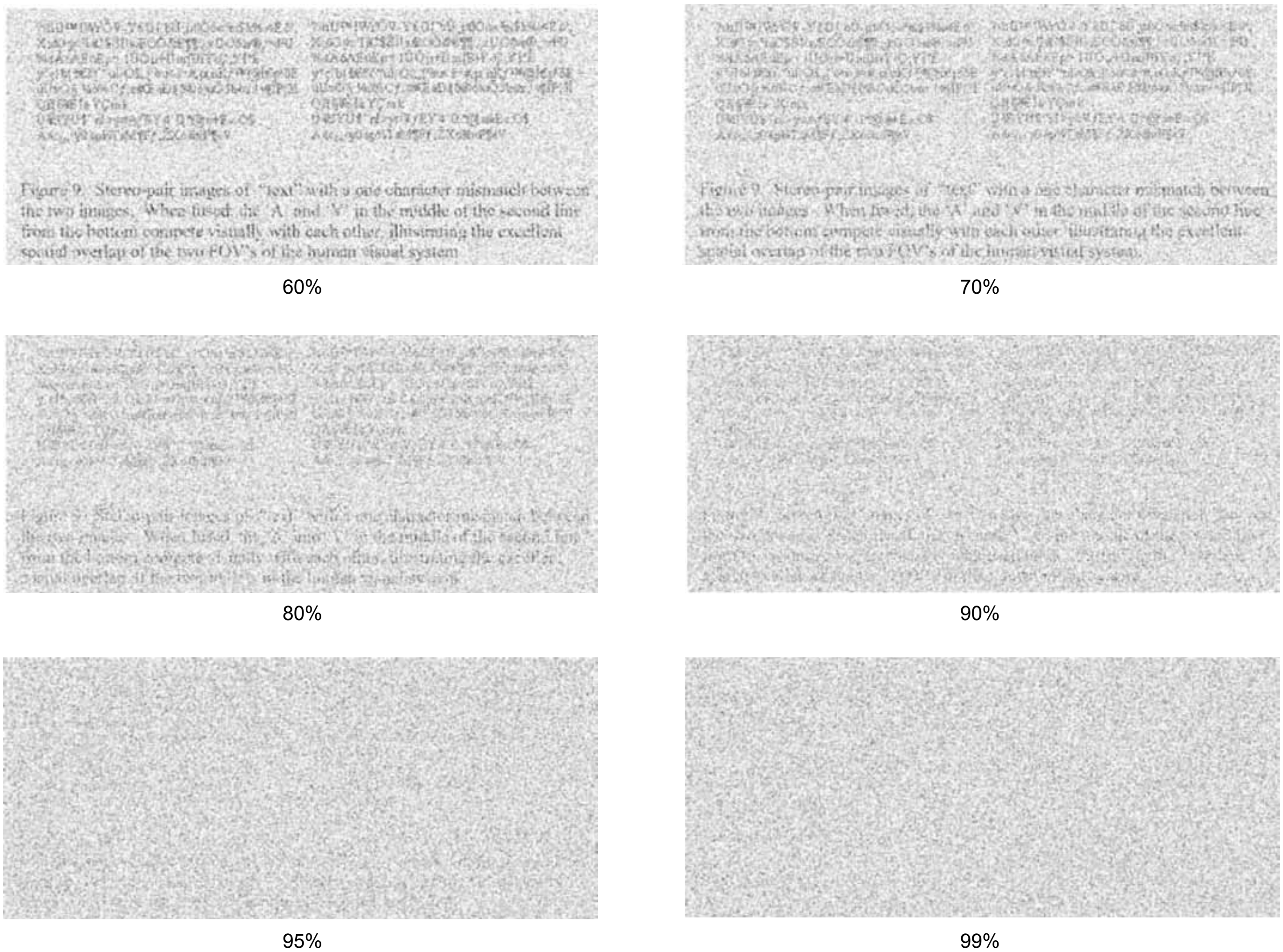

Figure 5 (continued)

CRSQ papers were published, but no evolutionist has offered a cogent answer or a detailed example. For those skeptical of this claim, just try to wire a 125 x 125 pixel "approximate fovea" digital camera (a 1/64th megapixel camera) by random processes, and then show everyone the details of how that random process can achieve a perfect match for the pixels. For this case, where there are about 15,000 pixels, the number of combinations ($15{,}000! = 2.75 \times 10^{56{,}129}$) is such a huge number, no person can comprehend it.

All Creation Is "Peaked"

While we are mainly presenting our analysis for the human visual system here in this paper, all of creation speaks to the same fundamental principle; namely, that each living organism is uniquely and perfectly adapted to its environment with all of its created features. The evolutionary videos we all have seen on TV speak to the incredible abilities of the creature being featured, "almost" as if these features were designed. But ask yourself how every living creature shows evidence of perfection in how it lives and functions. Where is the evidence for non-peaked creatures that evolution is still working on to improve the performance in some manner? Random processes should only produce "goo," if even that, so where is the goo that evolution is working on to turn into an ever-increasingly complex living creature? Why is every living creature peaked? How has evolution managed to peak the visual systems of millions of sighted species on the planet? Evolutionists, please show us a plausible scenario where randomness creates perfection in an image-forming system.

Randomized Video

As another visual depiction of a random process working on an image-forming system, we have taken a VGA format (640 x 480 pixels) color digital camera and photographed a simple scene with a moving object, in this case a bird hopping on a fence (see Figure 6). This could be thought of as a primitive eye's view of a scene where a human is trying to hunt for food. The randomization level was arbitrarily set at 50% for this video imagery, to illustrate what we could expect for quality in the final imagery at this level of randomness. Note that while this video clip is in color, little of the RGB (Red, Green, Blue) color fidelity is left intact with the 50% randomness-level imagery. Rather, the color is washed out even though 50% of the pixels are wired correctly. One has to wonder what the improvement is to such a colored scene as viewed with this level of degradation to the eye. How would a primitive eye be able to develop a color image capability in the first place, given the washed-out nature of the degraded imagery present in images like those presented in the video? Not only is it impossible for the wiring of the visual receptors to be correctly obtained by random evolutionary processes, but color vision further demands that the visual system successfully samples the visual spectrum (blue to red wavelengths) with color receptors, as well as sensitive rod (black & white) receptors for enhanced night-vision capabilities. Color receptors seem to add little if any visual improvement to the imagery at randomness levels at or above 50%, so how does natural selection work to improve such color imagery in the eye? Unless very little randomness already exists in the imagery, a degraded color image functions about the same as a degraded black and white image. Every time we examine the visual system with

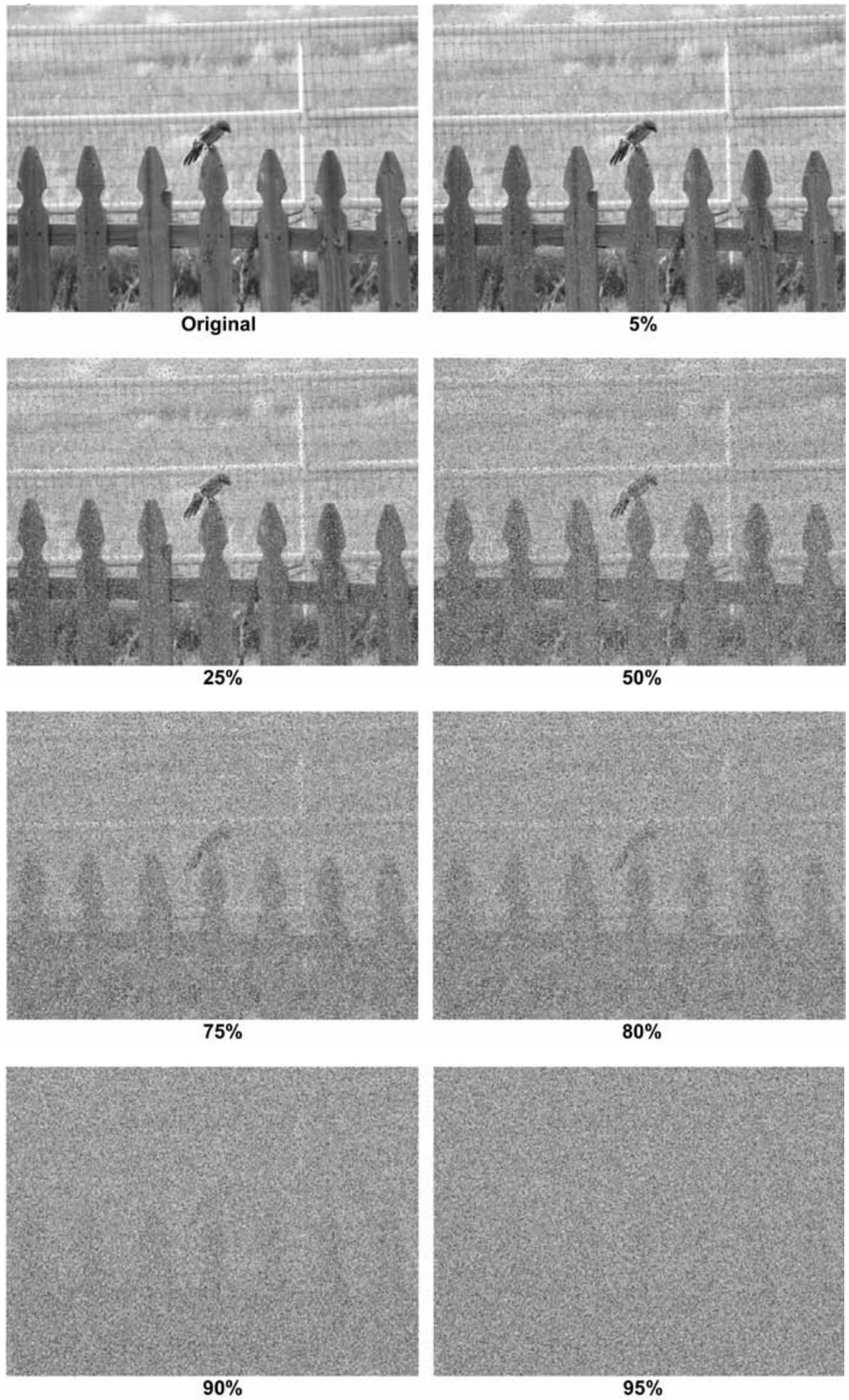

Figure 6. A VGA (640 x 480 pixels) format image of a bird sitting on top of a picket fence, with a finer grid white fence in the background. The fine-scale details vanish more quickly with increased randomization of the image. Little of the fine-grid detail of the white fence remains in the 50% image, while some of the predominately vertical detail of the dark picket fence and the bird remains at the 90% level. The color videos can be found on YouTube by searching for: "oemspectrastudios".

greater depth, more problematic issues arise that defy evolutionary answers.

The color video of the original scene (with no randomness applied to the images), as well as the 50% randomness scene video can be located at the author's YouTube website (https://www.youtube.com/playlist?list=PL8nzsFI8ARgjZeIXWgWIahm3hcSCJFdHV), or by searching YouTube for: "oemspectrastudios." In the 50% randomized video of the hopping bird, note how the fine structure of the feathers in the wings is lost in the noise, as is all of the detail in the head and beak area. When half of the visual field is randomly miswired, the visual results are devastating to the image quality, especially with the fine details. Note how all the black nail heads near the top of the fence disappear completely in the degraded image. How can natural selection work on such a degraded image, improve the visual performance, and still maintain the 50% of the image that is correctly wired? How can any random process figure this out? If we were to present this set of 640 x 480, 50% randomized pixels to an electrical engineer skilled in camera architecture and image processing, that person with all the complex tools available today could not remap the image to the correct state. One would have to know precisely how the random pixels are miswired in order to reconnect them correctly. Natural selection has no ability to tackle this formidable task, nor does the electrical engineer.

Figure 6 presents several black-and-white randomized images for the color visual scene depicted in the video clip, where a bird is perched on a picket fence, with a wireframe white fence in the distant background. This visual scene contains lots of information content that can be visually analyzed as the randomness in the image is varied. For example, the bird subtends a reasonable angular size to the visual system, about 50 feet away from the observer, even though the bird represents a relatively small part of the FOV. The wooden picket fence the bird sits on is relatively dark overall, has large horizontal and vertical features associated with the wooden planks, and can be contrasted with the thin grid of rectangular wires on the distant white fence in the background. So the visual details span a large range in terms of size and grayscale. The visual degradation caused by the random noise affects each of these visual details differently, and generally only the largest visual objects remain visible, albeit with lots of noise affecting even them.

Figure 7 presents three different visual scenes in black and white (color versions are online at: https://oemspectrastudios.imgur.com/), where the original scene is shown first, followed by a 50% randomly degraded scene. Coarse details (larger objects and features) remain, although degraded, in the randomized images, while lots of noise appears in the background of all of the randomized images. In the color images, the color saturation level, as well as the size of the colored object, affects the visual system's ability to discern the true nature of the objects being viewed. The 50% randomization level was chosen for these examples so that the reader can actually see the degradation done to variously sized objects in the FOV, because higher levels of randomization would blend all the colors into a uniform visual scene of basically one color determined by the original content of the RGB pixels in the true scene. If we were to ask for only 6 pixels in these VGA (640 x 480) scenes to be mapped correctly, that involves only 0.002% of this visual scene, leaving 99.998% of the scene as random information. At this level, all color information is lost as colored noise, and the color information provides no additional help to the visual system for image fidelity. The previous papers showed that if only one (1) pixel is to be correctly located (mapped) in these images by random processes, it would mean that 36.8% of the time that will occur and 63.2% of the time a single pixel would not be correctly located. For two correctly located pixels, it will occur 18.4% of the time, and 81.6% of the time randomization will not obtain the two correctly mapped pixels. For six pixels, 0.05% of the time six pixels will be mapped correctly, and 99.95% of the time they will not. To obtain one half of the pixels correctly mapped, as is the case in the (b) images of Figure 7, where half of the 307,200 pixels are correctly mapped, this condition will not happen in the lifetime of the universe regardless of how that is defined. So even the severely degraded images of Figure 7 at the 50% randomization level represent a "superb" image by random processes. Neither color nor black-and-white images will ever achieve the 50% correct-connection level by evolutionary processes.

Summary

The theory of evolution would have a very powerful testimonial argument if the visual systems of living things still showed evidence of randomness in the perceived imagery. That could mean that natural selection might still be working on the visual system to further improve the image quality. But this paper shows that visual systems like the human eye-brain complex show no evidence of random incorrect connections of the visual pathways from the eye to the brain. Our visual system is peaked in terms of performance that obeys the simplest optical law of object-image mapping, that is, the object scene is uniquely mapped to the image as simply as the imaging operation performed by a pinhole camera. The statistics involved with obtaining this correctly wired visual system prove that the wiring has to be a designed feature of our DNA, and not something that can be achieved by random processes. A photograph of a human face being viewed

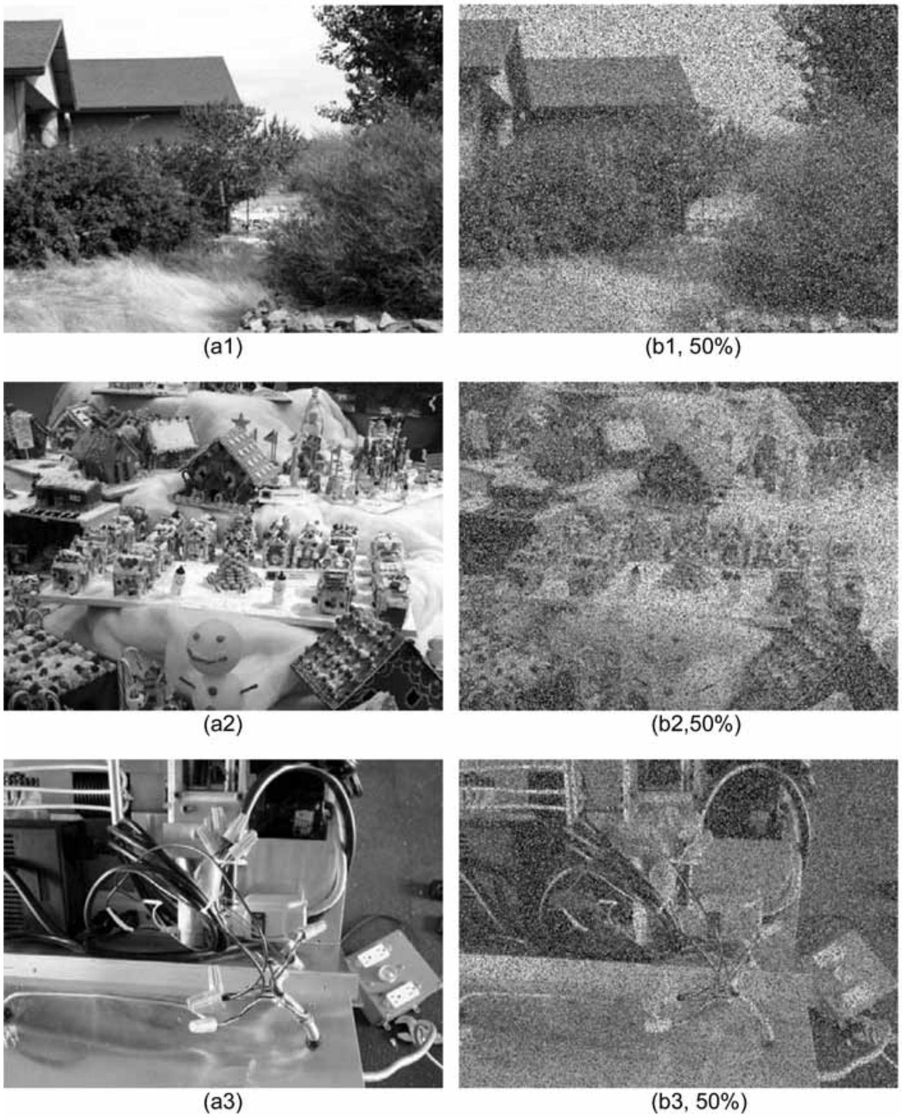

Figure 7. Black and White versions of three visual scenes (the color versions are online at: https://oemspectrastudios.imgur.com/), where the originals are a1, a2, and a3, and a 50% randomization level has been applied in b1, b2, and b3. In a1 the house scene has a small tree located in the center of the field, which is purple in the color image (online), and that tree gets quite degraded at the 50% randomization level with all the noise that populates the randomized image in b1. Similar degradations are evidenced with the gingerbread village of b2 and the electrical wiring image of b3. The color images online illustrate that the color saturation level of the various objects in the visual scene, as well as the size of those objects, all affect the perception of color after randomization is applied.

by a human eye shows no randomly incorrect wirings, or noise, in the image, as illustrated in Figure 4, and the other examples of visual scenes presented in the other figures further bear witness to our visual system, which has been pronounced to be "very good" by our Creator.

Evolutionists have it easy in the sense that clever stories can be told about some complex living process, where if one waits long enough with sufficient perturbations being applied during the process, wonderfully functioning life-forms arise to populate the planet. Our analysis for the human visual system shows such stories to be completely inadequate to describe how our visual system came into being. Random processes working on the visual system will produce only noise in the resultant imagery, and nothing useful would ever be seen by the sighted creature. Our Creator has allowed us to live today in a very advanced technological age, which also allows us to scientifically probe the very fabric of our creation. We are fearfully and wonderfully made in the image of God, and one would have to be blind to the facts to trust evolutionary stories.

Acknowledgments

I wish to gratefully acknowledge the work of Jeff Setterholm and his computer programming skills. Jeff wrote and compiled an executable program that takes an input digital image and randomizes that image to any specified level set by the user. This program was used to create the degraded images contained within the figures of this paper. I also wish to gratefully acknowledge the work of Brock Stoltzmann and his image processing skills, which helped to create the video segments referred to in the paper.

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