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Can We Believe What We See, If We See What We Believe?—Expert Disagreement

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ABSTRACT: Forensic experts often disagree. The possible sources of such disagreements are analyzed and possible avenues of resolution indicated. The logic of interpreting scenes, and pattern injuries such as bitemarks, is explained to locate potential sources for interpretive error, and to recommend strategies to avoid compounding such errors when preparing cases.

In one sense, two observers may not see the same thing, although their eyesight is normal and they are aware of the same artifact. Cases show that both practical and theoretical investigative expectations affect what count as observations. These expectations confer evidential status on the artifact. When two observer's expectations conflict, they do not see the same thing, so are not presented with the same evidence.

Expectations can be either appropriate, or inappropriate. These senses are clearly distinguished using illustrative cases. When inappropriate, they cause observational errors of a unique sort, supplying one source for disagreement. When inferences are made from these inappropriately sanctioned observations, interpretive errors are compounded and resolutions of disagreement become difficult.

These observational and inferential errors are explained, described, and illustrated with cases, along with recommendations for recognizing and avoiding them.

KEYWORDS: forensic science, expert disagreement, bitemarks, logic, pattern injury, criminalistics

An expert is someone continually learning more and more about less and less, eventually knowing everything about nothing.

Sir Bernard Spilsbury
(Nordby paraphrase)[2]

The Nature of Disagreement

On August 6, 1985, police surrounded an Essex farmhouse after receiving a call from Jeremy Bamber, the adopted son of the residents. He said that his 61-year-old father

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[2]Dr. Eric Gardner is reported by Douglas Brown and Tom Tullet to have heard Spilsbury say that an "expert was a man who went on learning more and more about less and less, until at last he knew everything about nothing." The statement is attributed to Spilsbury by Dr. Gardner in *Bernard Spilsbury: Famous Murder Cases of the Great Pathologist* by Douglas G. Brown and Tom Tullet, Dorset Press, New York, 1988, p. 187.

called him to say that his sister Sheila had gone crazy with a rifle. Then the line went dead. Police arrived, broke in, and discovered five dead—Neville Bamber, his wife June, their adopted daughter Sheila, and her twin sons Daniel and Nicholas. Neville had two black eyes and numerous cuts. Sheila was holding the murder weapon, a .22 automatic rifle in one hand, and a Bible in the other.[3]

When the police were called to the Bamber farmhouse, they were already expecting to find a domestic homicide/suicide, and that expectation filtered their view of the scene. They failed to observe the significance of Neville's injuries. This expectation became a source of error which was eventually corrected: Jeremy committed the murders using a silencer which he took off the rifle before placing it in Sheila's hand.

When errors, real or imagined, are recognized, there is potential for disagreement between those recognizing the error and those remaining unaware of it. In the JFK assassination case, David S. Lifton alleges a disagreement between the Dallas physicians' observations in the Parkland Hospital Emergency Room, and Dr. Humes' observations at Bethesda. He attempts to explain, and thereby resolve, this disagreement by arguing that both the Dallas and Bethesda physicians accurately observed the throat and head wounds and that the wounds were surgically altered between these two examinations. Such a far-fetched explanation is not required if one recognizes that both sets of observers saw the wounds through filters supplied by their areas of observational expertise.[4]

Given the basic potential sources for error: observational, interpretive, and inferential, "the resolution of disagreements" could mean their "rational resolution," when the disagreement is shown to be merely apparent, based on the recognition of a mutual misunderstanding, or when both parties to the disagreement correctly recognize an error, and accept the conclusion of a successful argument. Or it could mean their "persuasive resolution," when both parties agree for whatever reason, rationally justified or otherwise.

Given this distinction, it is possible to say that there is "disagreement" about President Kennedy's throat and head wounds, since Lifton is not persuaded that no "surgery to Kennedy" occurred between Dallas and Bethesda. In the forensic sciences, such "disagreement" is not of much scientific interest. It is useful to distinguish disagreements that involve potential for rational resolution from those that involve mere unsuccessful persuasion.

For practical purposes, these two types of disagreement can be called either *genuine*, disagreements occurring among qualified experts seeking a rational resolution, or *ingenuine*, disagreements occurring among charlatans and pretenders to expert status, or charlatans and qualified experts, when the interest is merely persuasion. Our focus is on genuine disagreement. How can we understand the grounds for a genuine disagreement between two honest, qualified forensic experts? Understanding such grounds has great practical utility. The goals of such an understanding are to help experts prepare cases, to recommend strategies to avoid compounding interpretive errors, to help avoid disagreements, to help recognize genuine disagreements, and to help resolve genuine disagreements while learning from them.

Disagreement—The Gap Between Seeing and Believing

The reality of forensic experts disagreeing in courts of law is commonplace. Consider the trial of Kenneth Bianchi. Bianchi was arrested in 1979 on suspicion of a double

[3]This case is described by Colin Wilson in his book *Written in Blood: Detectives and Detection*, Warner Books, New York, 1989, pp. 274–277.

[4]In this case, any potential disagreement was dissolved when the Dallas physicians visited the National Archives, viewed the autopsy photographs, and agreed that the photos showed the wounds they had seen in Dallas. Lifton remains unconvinced. But as J. W. Liebler put it, addressing Lifton ". . . I don't think there's anything that can satisfy you." (Quoted in *Best Evidence: Disguise and Deception in the Assassination of John F. Kennedy*, Carroll & Graf, New York, 1980, 1988, p. 291.)

murder in Bellingham, Washington. Investigators linked him to as many as seventeen murders in the Los Angeles area in a killing spree known as the Hillside Strangler Case. Bianchi's defense appealed to the legal concepts of insanity, and the psychological concept of multiple personality. Bianchi conceded that his hands had killed, but that a different person inside him named Steve Walker actually committed the multiple crimes of rape, torture, and murder. Both court-appointed psychiatrists and defense experts presented pretrial findings, and later in court, the defense held that Bianchi was a genuine multiple personality, while the prosecution argued that he was a malingerer, faking a multiple personality. The experts themselves became an issue in the trial: psychiatry itself became a defendant in the case.[5]

The conventional account of the logic of such disagreement holds that experts see the same thing and make the same observations, but that experts interpret what they see differently, and therefore reason from the same observations to support different interpretations. In this view, experts see the same thing, but don't believe the same thing.

There are serious limitations to this conventional account of disagreement among experts. First, expert opinion is trivialized and looks arbitrary. Interpretations appear contradictory and unreasonable: opposing interpretations appear to be supported by the same data. Explanations of the disagreement attack an expert's credibility, honesty, and integrity, thereby committing the ad hominem fallacy. And this account supplies no way to avoid or resolve disagreements among credible experts, leaving open the charge that an appeal to a particular "expert" is an unreliable appeal that commits the ad vercundiam (illegitimate appeal to authority) fallacy.

An adequate account of the logic of disagreement holds, in contrast, that experts can honestly develop interpretations and explanations, can cogently reason from data to support their explanations, and that the focus of many disagreements among forensic experts faced with pattern recognition problems, whether behavioral (for example, psychiatry) or physical (for example, scene reconstruction, bloodspatter, or bitemarks), or a combination of the two (for example, offender profiles from scene analysis) is most often one of conflicting observations.

Seeing is Believing—Or is it?

When Ted Bundy was arrested in Pensacola Florida in 1978, he was charged with murdering Kimberly Leach, a 12-year-old school girl from Lake City, Florida. The important physical evidence that convicted Bundy was a bitemark on the victim's buttocks. Bitemarks are pattern injuries of great forensic value: they may uniquely identify a perpetrator and place him or her in contact with his or her victim. The method to match the victim and perpetrator has five basic steps: 1) capture the bitemark; 2) capture the suspect dentition; 3) compare the two; 4) note similarities/ dissimilarities between them; and 5) explain dissimilarities/inconsistencies.

Unexplained dissimilarities or inconsistencies rule out suspects. Noted similarities enable investigators to identify a suspect as the perpetrator, or rule a suspect in, along with hundreds of others, as potentially the perpetrator. If there is no match between the teeth and the marks they allegedly left, then it is safe to conclude that those marks were not

[5]The disagreement between the psychological experts is noted by Darcy O'Brien in his book *Two of a Kind: The Hillside Stranglers*, Signet, New York, 1987. O'Brien states: "Drs. Watkins and Allison agreed that Bianchi suffered from multiple personality disorder and was not competent to stand trial. Had their advice been followed, Kenny would have spent some time in a mental hospital and then would have been released, when it was determined that his personalities had been "integrated" into one big, happy Bianchi. But Drs. Faerstein and Orne stated unequivocally that Bianchi should stand trial, and Dr. Orne's systematic dissection of Kenny's act proved decisive. (Detectives) Salerno and Finnigan's discovery that Steve Walker was an actual person. . ., and not inside Bianchi, was also important, although the multiple personality advocates argued that multiples often took the names of alter personalities from real life" p. 282.

made by those teeth. Forensic odontologists note that it is easier to observe dissimilarity between bitemarks and suspect dentition, and harder to identify uniqueness. It is this difficulty that often results in disagreements among bitemark experts. Disagreements are common for at least four basic reasons: 1) bites are not accurate reproductions of dentition; 2) bites include a limited number teeth; 3) skin is not suitable impression material; and 4) similar results may have different mechanisms.

Research done, or underway, can help eliminate these potential sources of disagreement. For example, we might investigate the kinds of marks bites leave, and how they are left, and investigate the physics of bites, including bite mechanisms through various types of cloth or other materials.[6] But current research does not explain disagreement based on "interpretive errors." A Sherlock Holmes style forensic science expert may resort to defining an interpretive error as an interpretation that disagrees with his or her own![7]

Seeing and The Nature of Observation

Understanding the organizational role of observation aids in understanding genuine disagreements among forensic experts. Observation powerfully influences interpretation and inference. Observations can differ subtly. If two observers look at a unicellular animal, amoeba, the first might compare the amoeba with liver cells, nerve cells, or epethilial cells, noting that amoebae are distinguished from these cells only by their independence. The weight is placed on *unicellular* rather than on *animal.* The second observer might make a comparison with creatures that ingest food, digest, assimilate, excrete, and reproduce like complete animals, except that amoebae have no cellular divisions. So in that sense, amoebae are seen as noncelled animals. The weight is placed on *animal* rather than *unicellular.*[8]

If these two observers were said to disagree in their observations, their disagreement would not be experimental. No mere set of tests could resolve the issue between them. Suppose that the first observer is a histologist, and the second is a zoologist. Each brings to the experience of seeing the amoeba different background information, habits, and theories, which in turn supply different contexts for their observations. The histologist looks at cells, and their parts. The zoologist looks at animals and their parts. Each has a point of view that helps organize their experience.

Certainly they see the same thing. But we must distinguish *seeing* from *observing.* Observing is an experience enriched by knowledge, beliefs, values, theoretical commit-

[6]See, for example, Norman D. Sperber, "Lingual Markings of Anterior Teeth As Seen in Human Bite Marks," *Journal of Forensic Sciences*, Vol. 35, No. 4, July 1990, pp. 838–858.

[7]Alan R. Moritz, M.D., presented an address to the Thirty-Fifth Annual Meeting of the American Society of Clinical Pathologists in 1956, "Classical Mistakes in Forensic Pathology," recounting his experience with error, and recommending how such mistakes could be avoided. Described by Dr. Moritz, "This Sherlock Homes type of expert may see certain bruises in the skin of the neck and conclude without doubt that they were produced by the thumb and forefinger of the right hand of the strangler. He may see an excoriation of the anus and maintain unequivocally and without benefit of other elements of scientific proof that the assailant was a sodomist. He ignores the essential component for proof of the correctness of any such scientific deduction, namely, the nonoccurrence of such lesions or changes in control cases. Such a pathologist usually has the happy faculty of failing to remember the many similar bruises of necks that were known to have been produced by mechanisms other than pressure by the thumb and fingers. He fails to remember the many anal and rectal excoriations that were caused by injuries other than sodomy. Such a pathologist is a delight to newspaper reporters owing to the fact that he "makes good copy." He may be highly esteemed by the police and by the prosecuting attorney because he is an emphatic and impressive witness." pp. 1389–1390.

[8]Colin Wilson states concerning the Bamber case that "Detection only comes into its own when the investigator is aware that he has something to detect." The amoebae example is developed by N. R. Hanson in *Patterns of Discovery*, Cambridge University Press, London, 1969, pp. 4-5.

ments, and the goals or purposes for looking in the first place. Seeing, on the other hand, is a physical state, a photochemical excitation that produces a neurological experience. In an important sense, "cameras and eyeballs are blind" and "there is more to "seeing" (in the sense of "observation") than meets the eyeball."[9] If a kindergarten student and Sir Bernard Spilsbury each look at a fractured skull, they both see the same thing in that they are presented with the same photochemically induced experience, but they do not see the same thing in the sense that they bring to their experience the same background. They can not be said to observe the same thing.[10]

Seeing Is a Kind of Believing

Observation is not interpretation. Observation involves implicit reasoning, and is instant; it is a mental experience. Interpretation, on the other hand, involves explicit reasoning and deliberate thinking. In February 1990, Coroner C. Dupha Reeves from upstate New York identified two charred remains brought to the Newark-Wayne Community Hospital morgue as the bodies of Vickie Lee Evans, 18, and her year-old baby. He was told that the remains were recovered from a fire in the mobile home where the two lived. He observed two charred bodies, one larger and one smaller, interpreted this observation as relevant to his identification, and inferred from it that the smaller remains were those of Vickie's baby. As stated in *Time* magazine, "He was wrong. The smaller body was that of a pet rabbit."[11]

This case calls to mind figure-ground perception experiments devised by Gestalt psychologists in the latter part of the 19th century. ('Gestalt' is German for pattern, shape, or configuration). According to Gestalt theory, observation involves organization of the visual field: a pattern that supplies a context to organize what is seen. Without that mentally imposed pattern, we do not "see" an organized visual field. A kindergarten student, looking through a microscope at stained tissue slides, may see only vivid colors and kaleidoscopic shapes, while a pathologist sees signs of myocardial infarct. A coroner may see a burned baby where a chef may see an overbaked rabbit. Their point is succinctly stated: the whole does not merely equal the sum of its parts. In literature, "plot is not just another detail in the story, and in music, the tune is not just another note in a string of notes."[12] Mentally imposed patterns organize the visual field.

Experiments have shown that elements in our experience do not cluster into these patterns at random. Visual observation appears to be organized by what Gestalt psychologists called laws of grouping. They explain patterns by laws of proximity, similarity, closure, continuation, common region, and connectedness.[13] Many familiar figure-ground parlor tricks illustrate these visual organizing principles. Understanding these principles shows how the mind may complete or fail to complete a visual field, supplying data that is expected, but not actually present, or omitting data that is actually present, but not expected. If we hear that Sheila Bamber went berserk, killing her family and herself, and bring that expectation to the scene, we may literally see things that are not there, and fail to see things that are present. If we expect to see the burned bodies of a mother

[9]Hanson, p. 6.

[10]A similar point is made by Hanson, p. 18.

[11]See *Time*, April 30, 1990, p. 43. The brief article continues: "The mistake was discovered a few weeks ago, when Gary Rotondo, Evans' live-in companion, returned to the burned out trailer and found the remains of a baby boy, who was later identified as his son." This type of misobservation in identification contexts is not uncommon. See for example, *Forensic Fetal Osteology* by I. G. Fazekas and F. Kosa, Budapest, Akademiai Kiado, 1978, p. 20, for a discussion of confusing frog bones with human embryo bones.

[12]Hanson, p. 13.

[13]See Rock, Irvin and Stephen Palmer. "The Legacy of Gestalt Psychology." *Scientific American*, December 1990, pp. 84–90.

and her baby, and bring that expectation uncritically to the morgue, that is what we will observe.

Simple visual examples of these laws can be misleading if we fail to note how their applications are affected by background knowledge, beliefs, values, and goals. When the histologist and the zoologist viewed the amoeba, different knowledge, theories, purposes, and experiences supplied different patterns to organize shared visual impressions. The physicians at Parkland hospital were not forensically trained, and did not observe President Kennedy's wounds with any forensic goals in mind. Dr. Humes, a hospital pathologist, was not an expert in gunshot-wound interpretation. Dr. Watkins, who was at that time writing a book on multiple personality disorders, used Bianchi as a prime example, and continues to believe that Bianchi is a genuine multiple personality. Dr. Allison, however, changed his mind. He became a prison psychologist, learned that his patients often tried to manipulate him to gain reduced sentences, or release, and that Bianchi, after all, fit that pattern of behavior. The coroner identifies remains; the chef evaluates cooking time.

All observations occur in a specific context: the context provides the organization of the sensory or conceptual field through background knowledge, experience, theories, and goals. David Lifton believes that conspirators altered Kennedy's body. Dr. Watkins' context of observation, when interviewing Bianchi, was as a committed believer in multiple personalities, anxious to find another example for his book. Dr. Allison, while a believer in multiple personalities, added to his context of observation through experience with prisoners attempting to manipulate him through lies and feigned illnesses or cures. All contexts create expectations which affect what we observe.

Seeing What We Believe: Expectation-Laden Observations

Observation is expectation-laden. Our expectations can be either appropriate, or inappropriate. Suppose that two observers are shown a video tape of the Jack Benny Show where Jack is playing his violin. The following summarizes the results for listener #1 and #2:

Listener # 1
—defines expectations in the context of serious music
—interprets out of tune notes as 'mistakes' to explain their bad sound
—infers
1. notes are confused
2. serious music does not confuse notes therefore,
3. playing out of tune is a mistake

Listener # 2
—defines different expectations in context of comedy
—interprets out of tune notes as 'deliberate' to explain their humor
—infers
1. notes are confused
2. humorous music does confuse notes therefore,
3. playing out of tune is deliberate

In this simple example, different expectations license different interpretations; different interpretations, in turn, license different inferences supporting different conclusions.

Not all expectations are equally appropriate for a given context: changes in context can change expectations. Dr. Allison, by adding relevantly to his experience, changed the context of observation for Bianchi's behavioral data. If Jack Benny is dressed in a clown suit, playing the violin with Harpo Marx, our expectations might differ from a time that Jack is dressed in top hat and tails, playing with Issac Stern. Understanding the context an observer supplies for an observation is necessary for understanding any inferences drawn through the observer's interpretations.

Believing It So Does Not Make It So

Inappropriate expectation-laden observations can lead to observational errors. Observational errors can lead to interpretive errors, and interpretative errors can lead to inferential errors. When expectations conflict, experts do not see the same thing, so they are not presented with the same evidence. Recall that "nothing is 'self-evident' unless the detective happens to be looking for it. Detective Inspector Ronald Cook admitted that the (Bamber) farmhouse had not been carefully searched "*because we did not consider at that particular moment it was relevant. . . .*"[14]

Expectations confer evidential status by licensing different interpretations, and supporting different inferences. If we fail to analyze specific conflicting expectations that supply relevance to different factors, giving evidential value to differing components, we will fail to clarify a genuine disagreement, let alone resolve it. Detectives Salerno and Finnigan discovered that the name Bianchi used for his "hidden personality," Steve Walker, was the name of a real psychology student in Van Nuys, California, whose student transcripts Bianchi had stolen, passing them off as his own. Even though Dr. Watkins maintained that multiple personalities often take the names of real people, we must consider the evidence. If Bianchi claimed that "Steve" was part of his personality from childhood, and if he had met the real "Steve Walker" through a transcript scam many years later, then Watkins' explanation appears weak. The claim that Watkins made an inferential error, however, is based on an underlying explanation supported by an analysis of conflicting, expectation-laden observations.[15] If your only tool is a hammer, then every problem is a nail.

To illustrate the role of investigative expectations, consider how they affect what count as observed bitemarks in a hypothetical homicide case. Expectation-laden observations commonly supply alternative contexts in such investigations. The dead body of a young woman is found on a roof, the victim of a vicious sexual assault. The detective in charge of the case, and the prosecutor are at the scene. Their reasoning is summarized as follows:

Detective (1)
—context: expectation of clues to discover perpetrator
—interprets an oval shaped mark as a bite to explain its presence
—infers
1. the bite was left by the murderer
2. sexual killers often bite their victims therefore,
3. this bitemark will I.D. a sexual murderer

Prosecutor (2)
—context: expectation of evidence to convict a suspect
—interprets oval shaped mark as a unique identifier
—infers
1. the identifier will convict the murderer
2. teeth are like fingerprints therefore,
3. this bitemark will convict the murderer

When inferences are made from inappropriate observations, interpretive errors are compounded. The body is taken to the medical examiner's office and the wounds are carefully observed. Both the detective and the prosecutor have failed to answer a prior

[14]Wilson, p. 277, my emphasis.

[15]A similar point can be made concerning expectations licensed by methodological explanations. In 1896, a series of misidentifications began when Adolf Beck was twice mistaken for a confidence man named William Thomas. The misidentifications, initiated by eye witness testimony, were "confirmed" by Bertillion's identification methods, and by a London Graphologist named Guerin, who explained apparent dissimilarities in handwriting between the perpetrator and Beck by claiming that Beck had "written in a disguised hand." Fingerprints eventually established Beck's innocence. See *The Century of the Detective*, by Jurgen Thorwald, Harcourt Brace and World, New York, 1965, pp. 64–74 for a brief discussion of the case.

question: what is this mark? There are several possibilities: it may be a mark but not a bite; it may be a bite that can not be individuated; it may be a unique pattern injury that is not a bite; it may be a pattern injury that is not interpretable; or it may be a bite that can be matched with a perpetrator's dentition. Two forensic odontologists are called to consult on the case, to help answer this prior question.

Neither the detective nor the prosecutor have the expertise to evaluate the injury. Most medical examiners, while expert in observing pattern injuries, may defer to a practicing forensic odontologist when bites are suspected causes of a pattern injury. The forensic expert refines the context of observation: the expert sorts appropriate from inappropriate expectations, using expert knowledge, experience, and theories that can be objectively supported. But experts also make expectation-laden observations.[16] Two consulting forensic odontologists approach the body, making observations. Their reasoning is summarized as follows:

First Expert (3)
—context: expectations of successful laser enhancement
—interprets oval shaped mark as a bite to explain presence on breast
—infers
1. when enhanced, this pattern injury is seen to be a bitemark
2. enhanced bitemark injuries can individuate a suspect therefore,
3. this bitemark can I.D. the probable murderer

Second Expert (4)
—context: expectations of limited enhancement potentials
—interprets enhanced ovoid mark as unidentifiable injury
—infers
1. if enhanced, this injury still lacks an interpretable pattern
2. enhanced unidentifiable injuries can not individuate therefore,
3. this injury will not I.D. a specific mechanism of injury

What explains the disagreement between these two expert forensic odontologists? A number of factors offer possible explanations. The interdependence of their expectations as experts in this case with their other expectations plays a role. Is hoping to find support for a pet theory, like the detective's or prosecutors's hopes to find and convict the killer, clouding the context of observation? Do the Dallas physician's backgrounds and approach to cases influence their observations of JFK's throat and head wounds? Does Dr. Watkins bring interests to his interviews with Ken Bianchi that eventually affect his interpretations? Answers to these questions may help to sort out interdependent expectations, and help us begin to understand disagreements.

In this hypothetical homicide case, background beliefs about enhancement technologies used on pattern injuries, past experiences with such technologies, and beliefs about the meaning of 'enhance' are relevant. If the second expert believes that lasers are useless as aids in pattern recognition problems, and that they simply create patterns that were not there previously, then these beliefs supply a context for skeptical observations. The first and second expert may also rank alternative explanatory contexts for what is seen differently. One expert may see similarities with previous cases involving stomping injuries with a boot heel, while the other expert has no such experiences. So one expert may rank 'boot stomping' as a higher probability than 'biting' as the mechanism of the injury.

[16]Concerning bitemark evidence, the so-called Windimere murder trial in Seattle, Washington illustrates the situation. Mrs. Gill and her daughter Katie were murdered in the fashionable Windimere area of Seattle. What appeared to be bitemarks were found on Katie. Brent Kendrick was charged with the crimes. The trial lasted from January 10, 1985 to February 1, 1985, and involved disagreements among reputable forensic odontologists ranging from those unwilling to identify the injury as a bite mark to the exclusion of other mechanisms, to those willing to identify the injury as a bite inflicted by a specific individual to the exclusion of all other individuals. See the appeal of State vs. Kendrick, 47, Wash. App. 620,736 P.2d 1079, May 11, 1987.

Clearer Images: Refined Contexts of Observation

The expert's role is to refine the context of observation based on expert understanding. The forensic pathologist, psychiatrist, bloodspatter expert, profiler, or odontologist brings to a scene background knowledge and experience that presumably help produce, test, and defend explanations. But the refined context supplied need not go unchallenged. The refinement supplied must be defended with scientifically supportable reasons. And any implicit, hidden observational expectations influencing supplied interpretations must also be examined.

To refine the context of observation, the expert must assess the entire scene, noting all the competing explanations, refusing to be guided by any inappropriate, preconceived expectations. An expert can not divorce all expectations, but can sort out the expectations at work, divide the appropriate from the inappropriate, and apply the scientifically supportable pattern(s) defining the observation. When an investigator is told to respond to the scene of an apparent suicide, the stress ought to be placed on *apparent*. We should ask "who made that determination?" "What is their background and basis for such a claim?" As the Essex police discovered, "apparent suicides" may turn out to be homicides. Other "apparent homicides" may turn out to be suicides, accidents, or natural deaths.

An expert must have all the relevant evidence to supply the refined context of observation. An expert's knowledge and experience refines the context of observation, but the refinement must be defended, interpretations supplied, and valid inferences drawn defending any possible conclusions. Refined contexts may support no inferences, and license no interpretation. The only supportable conclusion may be "I don't know."

Closing the Gap Between Seeing and Believing: Resolving Disagreement

When two experts disagree, and there is a reason to explore the disagreement to reach a rational resolution, the expert's role is to begin by clarifying the source of the disagreement, eventually stating and defending a resolution supported by good reasons. The steps to be explored in reaching this rational resolution may be summarized as follows: list expectations; see the whole context, note all pressures/expectations; decide their scientific relevance for observed effect(s); eliminate scientifically irrelevant expectations using expert knowledge; distinguish observations from interpretations and inferences; recognize that experts "see differently" with expectation-laden observations; recognize relevant patterns among all the data, not just a few points; identify the refined context of observation; reason to documentable, measurable, scientifically defendable interpretations by appeal to the refined context; avoid fallacies; and have the courage to say "I don't know" when the refined context does not allow inferences to support one interpretation over another.

Discussions go nowhere if interpretations are given for different things. If experts take the time to clarify the nature of the disagreement, then grounds may open for its resolution.

Conclusion

If we see what we believe, we may not be warranted in believing what we see. We may suffer from inappropriate, expectation-laden observations, or we may lack appropriate true beliefs needed to supply the refined context of observation: we may not be the appropriate expert. Unlike the Sophists that were targets for Socrates in ancient Athens, an expert, as part of his or her expertise, is aware of its scope and limits. Another part of expertise is to recognize, clarify, and evaluate expectation-laden observations, cautiously accepting or rejecting the context(s) they supply.

An expert supplies good reasons to support the opinion "I don't know" as well as to support the opinion "I know." Both knowing and not knowing are informed positions reached by careful application of scientifically defensible methods. When the results of those methods do not rationally allow us to prefer one conclusion over an alternative, we must settle for knowing why we do not know. Socratic humility has a place here, too. In these situations, an expert must follow Winston Churchill's advice: "Never resist the opportunity to remain silent."

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