Gary Hatfield

William Epstein: Experimentalist, Theoretician, and Teacher Extraordinaire

1. Introduction

As a lifelong student, collaborator, and friend of William Epstein, I offer some reflections on his relation to Gestalt psychology and to other theoretical tendencies in the psychology of visual perception. In doing so, I look back on nearly forty years of acquaintance.

I first met William Epstein when I visited the University of Wisconsin–Madison in spring, 1974, to decide if I wanted to accept an offer of admission to graduate school. I had applied and was accepted into the Department of the History of Science. My intention was to do graduate work that combined history of science, and in particular history of psychology, with experimental psychology and with the philosophy of science. In our meeting in his office, Epstein was encouraging. He saw no obstacle to my attempting to carry out the program that I was envisioning. Many years later, he told me that he was secretly smiling, thinking that the ambitious program I had laid out was a mere pipe dream of youth. I should mention that, during my years as a graduate student, Epstein never expressed his skepticism to me directly and it never seemed to enter into his interactions with me. I went to Wisconsin and completed a joint Ph.D. in History of Science/Philosophy/Psychology, sponsored by the three departments, with Epstein as my advisor in psychology.

It was characteristic of Epstein to keep an open mind, to wait and see what someone produced before fixing his judgment or determining his response. This quality was manifest during his years as editor of the *Journal of Experimental Psychology: Human Perception and Performance*, from 1982 to 1988. In discussing his editorial attitudes with him at the time, I was struck by his explicit intention to provide an open forum for a variety of different approaches to experimental work on perception. In particular, he intended to be more welcoming than usual (among mainstream American journals) to research that pursued a Gibsonian line – that is, to research that was inspired by the work of James J. Gibson. Epstein was no Gibsonian, but he deeply respected Gibson's work (1950, 1966).

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In discussions that I happened to have at the time with Gibsonians such as Bill Warren, I found that they were aware of Epstein's open-door policy. Several Gibsonian articles were published during Epstein's tenure, including Warren, Morris et al. (1986). Moreover, the Gibsonian James Cutting was selected as Epstein's successor as editor.

2. Experimenter and Theoretician

As Verstegen's article (in this issue) documents, Epstein is both an experimenter and a theoretician. I mention only two examples. First, the coin experiments (Epstein 1963). Epstein had taken an interest in the size–distance relation and, in particular, in the size–distance invariance hypothesis, according to which perceived size is directly determined by registered visual angle together with perceived or registered distance (Epstein, Park et al. 1961). Having previously explored various aspects of the size–distance relation (e.g., Epstein 1961), in Epstein (1963) he focused on the role of assumed size in determining perceived distance when objective distance information has been carefully eliminated. The experimental design is elegant. Epstein used photographs of U.S. coins that were well known at the time (a dime, a quarter, a half-dollar). The photographs were standardized to the objective size of the quarter. They were viewed monocularly in an otherwise dark alley. Subjects could adjust a binocularly viewed marker to indicate perceived distance, and they could adjust the size of a comparison spot, viewed binocularly at the mean of the distance settings for each subject for each coin, to indicate perceived size. He found that perceived distance varied with assumed size, in a way that was in close agreement with the predictions of size–distance invariance relation.

In the present context, an interesting aspect of the coin experiments is Epstein's explicit interest in how the coins "looked," or the "immediate perceptual experience" of the subjects (1963, 257). His interest in the phenomenal "look" of things stems from or perhaps explains the enthusiasm he expressed upon reading the section of Koffka's *Principles of Gestalt Psychology* entitled, "Why do things look as they do?" (Koffka 1935, 75). Epstein showed an abiding interest in Koffka's question (see Epstein 1967, preface), even at a time when, in the American context, the notion of the scientific study of subjective experience remained under attack from some quarters (as in Skinner 1963).

From among Epstein's theoretical writings, I wish to draw attention to an interesting and original position found in his discussion of a "taking into account" hypothesis (Epstein 1973) for explaining the constancies. According to the taking-into-account relation, perceptual experience of size or motion or other stimulus aspects are multiply determined by (unconsciously) combining various dimensions of stimulus information. In the case of size at a distance, registered information for visual angle (or retinal image size) would be combined

with a registered value for perceived distance to yield the experience of a size-at-a-distance (as in the coin experiments). Historically, various attitudes had been taken toward the established relations among visual angle, distance, and perceived size. Helmholtz (1867) and neoHelmholtzians such as Rock (1983) characterized the underlying process as an unconscious inference or deduction. In direct contrast, Gibson (1950, 1966) denied the need to posit any psychological processes of information combination; he held that the perception of size-at-a-distance occurs through the transduction of complex stimulus variables, without the need to posit an underlying process of information transformation and combination. As a third option, Koffka (1935, 237) spoke of a framework and the operation of forces within it to yield invariances of size (and shape, and other stimulus dimensions).

Epstein (1973) countered the Gibsonian perspective by indicating experimental work that showed independent control of the registered values and thus provided evidence for underlying combinatorial processes that determine perception. Such combinatorial processes are at odds with Koffka's (1935, 235–237) explanations in terms of frameworks and forces. A Gestaltist might see Epstein's combinatorial approach as a rehabilitation of the traditional account involving unconscious judgments (see Koffka 1935, 84–89). However, Epstein's "registered" values are not sensations conceived on the model of phenomenal experiences, but instead are dimensions of optical and ocular-motor information to which the visual system is sensitive. Distinctively, Epstein did not assimilate the underlying processes to judgment, inference, or deduction. Rather, he adopted the language of information combination, and spoke of a "combinatorial mechanism" (1973, 282). He later described this sort of mechanism as an internal algorithm, and taking-into-account as an instance of an "algorithm approach" (Epstein 1977, 11). In an historical overview of the approach, he singled out "the clear disposition among proponents of algorithm theory to refer to the processes *as if* they were conscious, cognitive and like reasoning" as a cause of theoretical "discomfort" (1977, 13), and he called for further clarification of the nature of the perceptual algorithm. He affirmed the viability of positing unconscious processes of information processing, while distancing himself from, or holding in abeyance, the characterization of such processes in terms of reasoning and inference.

3. Historian and Theoretician

Upon my arrival at Wisconsin in fall, 1974, I enrolled in a seminar that Epstein was offering entitled "Historical Foundations of Perceptual Theory." The content and character of the seminar reveal a third dimension of Epstein's intellectual profile: his engagement with the history of theories of visual perception.

Consulting my copy of the reading list for the seminar, I see that it included Pastore (1971) as a secondary source. However, somewhat uncharacteristic of

graduate teaching in psychology at the time, the list consisted mainly of classical primary sources, some dating back more than 250 years: Berkeley (1709); Helmholtz (1962, vol. 3, selections); James (1890, vol. 2, 211–282); Koffka (1935, 69–102); Köhler (1947, 100–205) or (1940, 1–106); Brunswik (1956); Gibson (1950); and selections from Kilpatrick (1952) or (1961). The actual topics for discussion during seminar meetings gave strong representation to the empiristic theory (Berkeley, Helmholtz, Brunswik, transactionalism), but also presented other perspectives, including a heavy dose of Gestalt writings (discussed for three seminar meetings) and a full treatment of Gibson (two seminar meetings). Epstein began each seminar meeting with an overview of the position to be discussed. These were critical summaries. He first presented the various positions on their own terms and then offered a systematic criticism. Looking back at my notes nearly forty years later, I am especially struck by his initial discussion of Berkeley's *New Theory* (1709), not only for its mastery of Berkeley's text, but also for its historical sensitivity combined with the use of more recent empirical studies to challenge some of Berkeley's claims and assumptions. As the semester went on, students were assigned topics to present during seminar time, but Epstein's remarks during the first part of the meeting continued to provide the primary framework.

In the discussion of Gestalt theories, Epstein began by emphasizing and explaining the Gestalt enjoinder to take "direct experience" as the basic data for psychology. He discussed the Gestalt accounts of the stimulus error and the experience error, which he characterized as two different ways of confusing perceptual experience with knowledge (about the distal object, or about the retinal image). He examined in detail Gestalt objections to the constancy hypothesis, that is, to the hypothesis that perceptual experience directly reflects local stimulation, atomistically conceived. He also noted that the Gestaltists recognized that local stimulation can vary without a change in the concomitant percept, as in size constancy or lightness constancy. (Note that the meanings of the word "constancy" in the two preceding sentences have nearly opposite theoretical connotations, on which, see Gilchrist 2012, 107.) Gestalt theory made perception a function of global stimulation as mediated by organizational processes, conceived physiologically. Epstein was critical of the Gestalt tendency to posit physiological processes on the basis of the phenomenal experience of organization and then to explain the phenomenal organization on the basis of the posited brain processes. He was not objecting to theoretical posits in general, but rather to what he considered to be a lack of independent evidence for the specific characteristics attributed to the brain processes. He also led a critical discussion of Gestalt organizational principles themselves, apart from their physiological basis. He was particularly keen to explain that, from a Gestalt point of view, retinal stimulation is not inherently organized. It does of course consist of an array of light energies, but

the matter of which small regions go with or belong to which other regions is settled only once the visual system has created organization and structure in perception. More generally, he found that the notion of *Prägnanz*, or a minimum principle, was vaguely formulated. Greater specificity of the notion of simplicity was needed. He also questioned the causal efficacy of the "whole," remarking that in the Gestalt conception, wholes seem to operate by themselves, above and beyond their parts.

In the preface to his first and only monograph, *Varieties of Perceptual Learning*, Epstein summed up his intellectual and scientific agenda as follows (1967, preface):

> "Among my earliest readings in the psychology of perception were Koffka's discussion of 'why the world appears as it does,' J. J. Gibson's *Perception of the Visual World*, and several chapters in a collection called *Human Behavior from the Transactional Point of View*. These efforts were undertaken while I was a first-year graduate student in a course in perception given by Hans Wallach. I completed the course, enthusiastic about the study of perception but considerably puzzled by the theoretical divergences which prevailed. Since then I have been at work to reduce the dissonance which resulted from exposure to such disparate but highly persuasive arguments. This book on perceptual learning stems from this larger effort."

The book sought to render the disagreements among viewpoints into empirical questions. Epstein noted that learning theorists regarded perceptual learning as a mere instance of the more general principles of stimulus–response learning, whereas the Gestalt psychologists were convinced that "the principles of learning are corollaries of the principles of perception" (1967, 18). He characterized these contrary viewpoints as instances of letting one's theoretical predispositions settle the general question of perceptual learning, independent of systematic empirical investigation of the matter.

It is worth noting that all three of the publications Epstein mentions in the above quotation emphasize the importance of the perceptual constancies, such as those of size, shape, or lightness. In this regard, Epstein was confronted early on with agreement about important aspects of how things look (there is a tendency toward constancy), together with theoretical divergence over how to explain why things look that way. The constancies of size and shape were central to Epstein's early theoretical and experimental studies (Epstein, Park et al. 1961, Epstein, Bontrager et al. 1962, Epstein 1963, Epstein & Park 1963), prior to the publication of the book, and continued to occupy him in subsequent decades.

In his book, Epstein defined perceptual learning as occurring when there are "changes in perception" that occur "in response to unchanging optical stimulation" (1967, 1). That is, as a result of perceptual learning, a given stimulus that used to produce one perceptual response produces a different response

(figural aftereffects and color adaptations are excluded, but changes in response to artificial transformations of the entire optic array are allowed). The book first focused on the "assumptive context," in which prior knowledge, gained through learning, affects perception, as in the coin experiments. In subsequently considering "the role of practice and prior exposure" on perception (1967, 87), Epstein took up two themes from Gestalt psychological research. The first was the role of prior exposure on figure–ground organization, or "figural persistence" (1967, 94). Epstein's review of the literature found sufficient evidence to support the notion that prior exposure can strongly affect which figure–ground organization is experienced in an ambiguous test stimulus.

The second theme concerned the Gestaltists' claim that prior exposure has little influence on the subsequent detection of forms that have been embedded into a more complex form (see Koffka 1935 and Köhler 1947). Epstein reviewed results that revealed the positive effect of prior exposure. He raised doubts that the well-known experiments of Gottschaldt (1926, 1929) were methodologically appropriate for determining whether prior exposure does facilitate the detection of embedded figures (see Epstein 1967, 101–106).

In the conclusion of the book, Epstein made clear that he diverged from the general Gestalt attitude that offered "reticent recognition of the possible effects of learning" (1967, 303). But he did not find that the empirical results supported the strong empiricism of transactionalists such as Brunswik. Rather, he endorsed a middle way, while recognizing that: "The middle ground is an especially demanding position. It requires that one specify the conditions and limits of the effectiveness of many diverse variables" (1967, 304). A typically honest, concessive, and yet incisive Epsteinian aperçu.

4. Teacher, Mentor, and Collaborator

Epstein is an excellent teacher, and his seminars were welcome intellectual events. In subsequent years during my time as a student, my supervisor from philosophy, Fred Dretske, sat in on Epstein's seminar. The atmosphere was organized and serious, and yet provided the framework for open-ended intellectual engagement with the ideas and findings of the relevant literature in the psychology of visual perception.

In directing the part of my doctoral work devoted to the psychology of perception, Epstein considered it important for me to conduct laboratory experiments of publishable quality. Hence, we embarked on an investigation of the shape–slant invariance relation under limitations of processing time as determined by the use of a masking paradigm to study the perception of two families of projectively equivalent ellipses shown at various slants (Epstein, Hatfield et al. 1977). This was, to my knowledge, the first use of a masking paradigm with three-

dimensional stimuli. We found that perceived shape did vary with perceived slant in the predicted direction, but not with the same close match to the values predicted by the shape–slant invariance hypothesis as was found for the size–distance relation in the coin experiments. We took the findings to support a weak form of the shape–slant invariance hypothesis. We interpreted the results of a subsequent experiment, on the functional equivalence of masking and cue-reduction (monocular viewing) in the perception of shape at a slant, in terms of a process model for separately registering and integrating shape and slant information (Epstein & Hatfield 1978).

As a doctoral mentor, Epstein emphasized that sustained research of any type (in my case, typically, reading and writing) should aim to produce publishable work. Consequently, in addition to the laboratory work, we undertook an historical investigation of the origin of the concept of a "sensory core," which we understood in its historical setting to consist of the notion that visual perception begins from a consciously accessible sensation that shares the projective properties of the retinal image (leaving aside inversion). We set out to investigate the origin of the concept of a two-dimensional representation that was, at least in principle, available to consciousness, and we expected to find that origin in eighteenth- or nineteenth-century theories of vision. The need to trace the origin both of the concept of a two-dimensional representation and of the notion that it might be consciously available took us back into the medieval period and to the change in philosophy of mind that occurred with Descartes. Ultimately, we concluded that the concept originated in Descartes' notion of the second grade or stage of sense perception, in which he posited a two-dimensional sensation or sensory idea. An early version of the paper was presented at the annual meeting of Cheiron in 1976 and then submitted for publication but not accepted. A revised version was accepted by *Isis*, a leading journal in the history of science (Hatfield & Epstein 1979).

After I had graduated and taken up a position as an Assistant Professor of Philosophy, we continued to collaborate on theoretical papers, including works on the minimum principle and the Gestalt notion of *Prägnanz* (Hatfield & Epstein 1985) and on the interaction between Gestalt psychology and the philosophy of mind (Epstein & Hatfield 1994). Most recently, we collaborated on an epilogue to a new edited volume on sensation, cognition, and constancy as dimensions of or factors in visual experience (Hatfield & Epstein 2012). These papers include philosophical discussion. Epstein's engagement with philosophy constitutes a fourth dimension of his intellectual profile. Among psychologists, Epstein was notable for his interest in and appreciation of philosophy. I have mentioned that Dretske attended his seminar; he also had ongoing discussions with Epstein. Indeed, Epstein's long-standing tendency to maintain relations with philosophers may well have raised the eyebrows of some of his colleagues in psychology. The

practice continued as the philosopher Lawrence Shapiro arrived on campus in the mid-1990s. He and Epstein forged a close intellectual relationship, resulting in Shapiro and Epstein (1998).

Through his example and in discussions as a mentor, Epstein taught me to focus on the work and its quality and value, and not to put much effort into academic sociology. Although he forged lifelong relations with many colleagues and students, he expressed no need to undertake any special efforts to expand the ambit of such relations by traveling to meetings or seeking opportunities to network. His efforts in this regard were toward producing interesting work of high quality and engaging in productive discussion as the occasion arose. He was not oblivious to the social dimension of acquiring a good academic reputation, but he responded to that dimension by recognizing that to get your point across you may need to develop a series of experiments, or theoretical papers and experiments, and also to present your main ideas in different venues. Upon the publication of my first monograph (Hatfield 1990), he advised me to follow it up with a journal article containing some of the main points – a sort of abbreviated summary. For whatever reason, I did not follow his advice. As it happens, he produced his own summary of the work's main points in relation to the history of psychological theories of vision (Epstein 1992).

5. Conclusion

Overall, what stands out about Epstein is the quality and incisiveness of his thought, whether in dreaming up experimental scenarios, in discussing the history of visual theory, or in seeking to understand and perhaps to modify or articulate the explanatory model embedded in a particular theory of visual perception. Other aspects of the man are salient, such as his dry wit and his affection for his family and his students. Whether he is a closeted Gestalt psychologist or instead a theorist who draws on Gestalt insights for his own purposes, he is an attractor in the behavioral environment that exhibits the forces for understanding the history, philosophy, and psychology of visual perception.

Summary

William Epstein is an important theoretician and experimentalist of the latter half of the twentieth century and extending into the first decades of the twenty-first century. He was educated into the Gestalt psychological tradition, a tradition that he engaged in critical interaction throughout his career. In both his research and his teaching, he attends not only to the latest empirical results (to which he has frequently contributed) but also to the theoretical, historical, and philosophical dimensions of perceptual theory.
Keywords: Gestalt psychology, visual perception, algorithm approach.

Zusammenfassung

William Epstein ist ein wichtiger Theoretiker und Experimentalist der zweiten Hälfte des zwanzigsten Jahrhunderts, dessen Bedeutung sich darüber hinaus bis in die ersten Jahrzehnte des einundzwanzigsten Jahrhunderts erstreckt. Er wurde in der gestaltpsychologischen Tradition ausgebildet - eine Tradition, der er in kritischer Auseinandersetzung während seiner gesamten Laufbahn verbunden blieb. Sowohl in seinen Forschungsarbeiten als auch in seiner Lehrtätigkeit hat er sich nicht nur mit neuesten empirischen Ergebnissen - zu denen er auch selbst immer wieder beigetragen hat – befasst, sondern auch mit theoretischen, historischen und philosphischen Dimensionen der Wahrnehmungstheorie.
Schlüsselwörter: Gestaltpsychologie, visuelle Wahrnehmung, algorithmischer Ansatz.

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