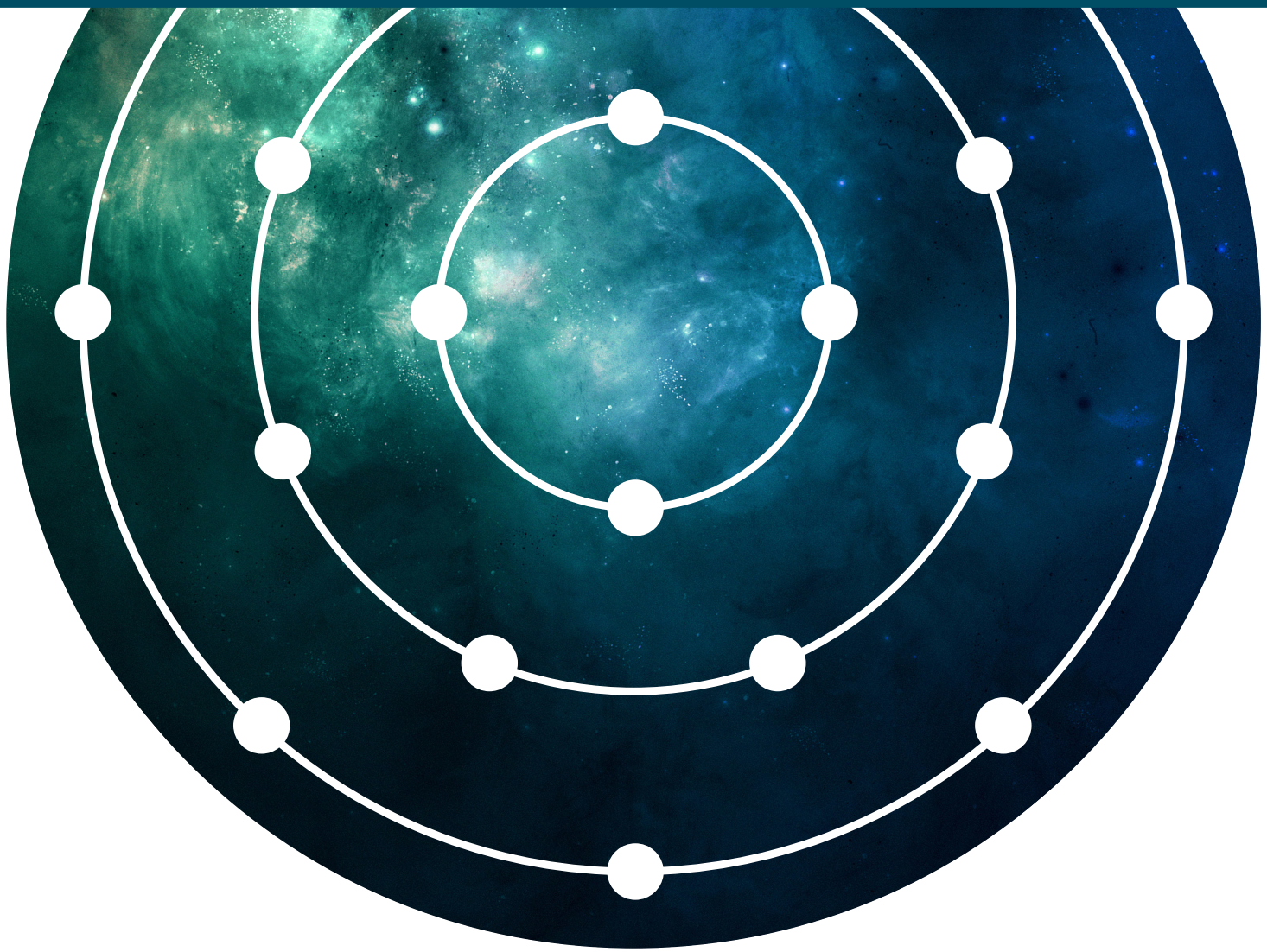

Journal of Anomalous Experience and Cognition

JAEX VOLUME 2, ISSUE 2, 2022

ISSN: 2004-1969

Journal of Anomalous Experience and Cognition

Volume 2, Issue 2, 2022

ISSN: 2004-1969

Journal of Anomalous Experience and Cognition

(JAEX)

Original Layout Design

Nikolaos Koumartzis, SEIKILO Cultural Organization

The *Journal of Anomalous Experience and Cognition (JAEX)* provides a forum for the rigorous, multidisciplinary study of anomalous experience and cognition. Anomalous experience refers to spontaneous or induced unusual but not necessarily pathological experiences, such as mystical and out-of-body experiences. Anomalous cognition refers to rigorous multidisciplinary research that seeks to improve our understanding of psycho-physical interrelations. It includes the hypotheses that organisms can be affected by spatially or temporally distant stimuli -unmediated by the senses or reason- and that intentions can directly affect physical systems, as well as related attitudes, beliefs, and other variables.

Publishers: CERCAP/PF, Etzel Cardeña, Ph. D., Department of Psychology, Lund University, Allhelgona kyrkogata 16a, Lund, 22100, Sweden

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IN MEMORIAM

Rex Stanford (1938-2022):

A Personal Reflection and Appreciation

Miguel Roig[1]

St.. John's University

My colleague, mentor, and friend, Rex Stanford passed away on May 11, 2022. He was part of a stellar group of parapsychologists that included Robert Morris, Chuck Honorton, Jim Capenter, and John Palmer, among others, who worked in J. B. Rhine's lab at Duke University in the mid-1960s and who themselves independently went on to make significant contributions to our understanding of psi phenomena. During the time I knew Rex, we had many discussions about various matters related to psychology, parapsychology, and science in general and thus feel comfortable in providing the following remarks. I note, however, that my commentary on Rex's extensive research record will surely lack the level of depth it merits, for I feel that I am not sufficiently versed in the parapsychological literature to offer a thorough appraisal of his many contributions to the field.

I first became acquainted with Rex's work in the spring of 1976 when, as an undecided college sophomore, I enrolled in a popular undergraduate philosophy course titled "Psychic Phenomena and the Nature of Man" taught by Michael Grosso at the New

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For some of the material discussed in this piece, the following PF videos were consulted: https://www.youtube.com/watch?v=mQlgLwlZ8uU&t=211s;, https://www.youtube.com/watch?v=y5412ktzIrE&t=742s; https://www.youtube.com/watch?v=JLOwud2arNg&t=962s.

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https://doi.org/10.31156/jaex.24463

Jersey City State University (formerly Jersey City State College). Initially inspired by that course and under Grosso's helpful guidance, I began to immerse myself in the parapsychological literature by reading books on the subject and by subscribing to periodicals, such as the *Journal of Parapsychology* (*JP*) and the *Journal of the American Society for Psychical Research* (*JASPR*). Living in a town in New Jersey situated right across the river from Manhattan, I also took advantage of my proximity to the ASPR and to the Parapsychological Foundation (PF), which at the time were both located in New York City (NYC) and visited these facilities on several occasions to browse through their libraries and attend ASPR-sponsored presentations by noted parapsychologists such as William Braud, Stanley Krippner, Helmut Schmidt, and Ian Stevenson. Arguably, still the golden years of parapsychology, these meetings were held in a large auditorium in the United Engineering Center, a modern hi-rise that was home to various engineering associations (sadly, the building was demolished in 1998 and the space is now occupied by Trump World Tower, a residential building). One such ASPR-sponsored event I attended and tape-recorded in the late 1970s was a dual presentation by Rex and Ray, his identical twin brother. Ray, who is known to have shown exceptional, ostensible psychic ability, is himself a remarkable explorer in the citizen science tradition with his most recent contributions being in ichnology, a subfield of paleontology (see Stanford et al., 2007, 2018; Vastag, 2012). Little did I suspect at the time of Rex's lecture that I would soon be carrying out research under his supervision and would later become his colleague and friend.

Following Grosso's advice, I ended up double majoring in psychology and philosophy with the eventual goal of embarking on an academic career and carrying out research in parapsychology. After earning my undergraduate degree in 1979 I enrolled in the Master of Arts (MA) program in General Experimental Psychology at St. John's University (SJU) in Queens, New York, where Rex had been a psychology professor from 1973 to 1976. Although I was aware that Rex was no longer at SJU –he had assumed the position of director at the newly established Center for Parapsychological Research in Austin, Texas- I had hoped that at least some of the psychology faculty at SJU were a bit more "parapsychology-friendly" (some were) relative to those at my undergraduate institution, and that I might perhaps pursue my interest in that field with one of them. As it turns out, however, I found other ongoing research areas in that department equally exciting, specifically research in visual perception and in cognitive neuropsychology, both of which would become important themes in my own professional development; the former for my doctoral studies at Rutgers University (Newark campus, New Jersey) and the latter for my own research as a beginning academic.

Sometime in the Spring semester of my first year (1980) in the MA program, Leonard Brosgole, who at that time was department chairperson, was aware of my interest in parapsychology, and with whom I had been carrying out research, called me into his office to share the good news that arrangements were being made for Rex to return to SJU as a faculty member. And, thus, at the start of the new academic year in early September, I was introduced to Rex as his graduate research assistant (GA) and so began my life-long association with one of the top experimental parapsychologists of his time; a mentor and friend whose thoughtful guidance left an indelible mark on my own development as an individual and an academic.

Rex was born on June 21, 1938 in Robstown, a western suburb of Corpus Christi in the state of Texas. With a subtropical climate and its associated rich foliage and fauna, Rex enjoyed and appreciated the natural beauty of the area. Raised by nurturing parents who encouraged his drive to learn and understand the world around him (Stanford, 2013), Rex was already reading voraciously and widely ranging from subjects in philosophy and religion, particularly Hinduism, to books in the sciences, including works by Darwin, Freud, Hoyle, and Einstein. The contributions of the latter two authors led Rex to consider the study of theoretical physics as a career path and, to that end, he read a considerable

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amount in areas such as relativity theory and cosmology and even made student presentations on some of these subjects at Texas Junior Academy of Sciences meetings. A pivotal experience at one of these encounters, however, ended up having a profound impact on his conception of the way the universe was supposed to work: He attended a presentation given by a fellow student about parapsychology, specifically, about the work of J. B. Rhine. Rex became very intrigued by what he had heard and felt that he needed to learn more about ESP phenomena. He befriended that student and not only did he begin to read about Rhine's research, but Rex went on to carry out his own ESP experiments with his friend and even initiated correspondence with Rhine himself. He reconsidered his earlier career aspirations and decided instead to major in psychology. During his undergraduate studies in psychology at the University of Texas, Austin, Rex visited Rhine's lab at Duke University on several occasions and interacted with him as well as with many of his associates who were at the time carrying out ESP research.

Rex's early commitment to parapsychology began to pay off: His first professional contributions to the field were two presentations he gave at the annual meeting of the Parapsychological Association (PA) held in New York in 1963, subsequently published the following year in JP as separate journal articles. From that point on, Rex continued to steadily present his work at PA meetings and to publish it mainly in the *JP* and *JASPR*. During his long career, he also presented in other venues, particularly in meetings sponsored by the PF, which had also provided him with a considerable amount of funding, but also in non-parapsychological conferences, such as the Annual Meetings of the American Psychological Association and at the American Association for the Advancement of Science.

Those who have worked with Rex and/or who are well acquainted with his extensive research record would probably agree that, as a parapsychologist and psychological scientist, he was first and foremost an experimentalist. His emphasis on an empirical

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approach to the study of psi can be partly traced back to the work of J. B. Rhine (Stanford, 2013). Like Rhine, Rex felt strongly that the most effective approach to begin to understand the nature of psi events is to study them under controlled, laboratory settings and to systematically manipulate the conditions, both physical and psychological, thought to facilitate them. However, Rex also recognized that in order to have a good understanding of how psi operates it was important to "get close to the phenomena" and, in that regard, he very much valued the work of those who studied psi in more naturalistic settings. In fact, Rex himself has acknowledged that his research was often informed and/or inspired by the careful observations and/or thoughtful reflections of non-experimentalists such as Jules Eisenbud, Bill Roll, and Louisa Rhine. For example, it was one of Louisa's cases that, in part, led to a study (Stanford, 1970) which Rex credits as being the impetus for the development of what is perhaps the most fruitful theoretical development in parapsychology, the "Psi-Mediated Instrumental Response" (PMIR; Stanford 1974a,b), for which he received the PA's Outstanding Contribution award in 1993. Essentially, the PMIR proposes that unconsciously psi-derived information can alter our behavior/cognition in favorable ways that lead to the satisfaction of our needs. One of several examples Rex used to illustrate how the model works was an incident involving a retired attorney who was riding the NYC subway on his way to pay a casual visit to some friends. The man gets off at the correct stop because he needed to switch trains to get to his destination. But, instead of waiting for the second train to arrive, the attorney absentmindedly walks right out of the station. Realizing his mistake and not wanting to pay another train fare, he decides to walk the rest of the way as his friends lived just a few short blocks away. Surprisingly, as the attorney was walking toward his friends' residence, he ran into them as they were on their way to an appointment elsewhere. Surely, each of us can probably recall a handful of incidents such as the one above, which can be easily explained away as a mere coincidence. But, according to Rex, another possibility is that the PMIR is at work in such cases. At some point during the train ride, the attorney may have unconsciously

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picked up the information about the whereabouts of his friends via psi, leading to his "inadvertent" choice of leaving the train station (instrumental response) to fulfill his wish (need) of seeing his friends who he would otherwise have missed had he taken the correct sequence of trains. Rex suspected that because many such experiences may not appear as unusual or appear to involve ESP, they will not be reported to investigators thereby introducing a source of bias in case collections (Stanford, 1978).

Thus, as much as many of us will think of Rex primarily as an experimentalist, he was also very much a theoretician. For as long as I can recall, Rex was concerned about the general absence of testable theories to guide psi research. He likewise thought that certain areas of psychology were similar afflicted by what he felt were weak theoretical underpinnings. In part, he attributed this situation to parapsychologists' (and psychologists') lack of proper training in theory building, noting that much time is spent in Research Methods classes learning how to design and conduct experiments, but that little time is spent on learning how to appreciate, let alone construct, a good scientific theory. With respect to the latter point, Rex traced his affinity toward the need to have a solid theoretical foundation to a course in the philosophy of science that he had taken as a graduate student and, specifically, to a paper by Hempel and Oppenheimer (1948), which he felt should be required reading for all aspiring scientists. It is in this general context that his PMIR became such an important contribution to parapsychology, for here was a testable model about the functional characteristics of psi that received considerable experimental support from various independent labs and which Rex continued to refine over the years (e.g., Stanford 1990, 2015) based on the evidence the model had generated. His less popular, but arguably more intriguing (at least to me!) "Conformance" model (Stanford, 1978) was another example of his attempts to better understand psi by thinking creatively, "outside the box", but always with the goal of providing better conceptual clarity as well as a means of generating testable hypotheses. In this newer approach, Rex posited that psi was a process by which a disorganized operation, such as the output of a random event generator (REG), "conforms" to the needs or preferences of the organism. For example, consider a psi experiment in which a volunteer is asked to bias the output of a REG device that randomly displays a flash of either red or blue light by attempting to increase the number of red flashes. In this scenario, the inherently disorganized REG's biased output favoring the red color is said to "conform" to the participant's (and the experimenter's) preference for that color. In other situations, it is the individuals' sometimes disorganized, labile mental state that produces the output that conforms to that same individual's needs. As an example of such a scenario, Rex cites a situation in which volunteers in a "clairvoyance" experiment are instructed to describe randomly selected images that are hidden from view in opaque envelopes. To do the task, they likely will rely on the many images they have stored in their minds, but which are only haphazardly accessible to their awareness as they attempt to select a match they deem to be appropriate. Those image selections scored as "hits" are said to conform to their presumed wish/need to be correct.

During our many discussions, I was always impressed with Rex's exceptionally comprehensive and detailed knowledge of the parapsychological literature, particularly of the laboratory evidence for psi. My sense is that it was primarily based on that evidence that he was convinced of the reality of the psi, even if, as he often acknowledged, we still do not know much about how the phenomena manifest themselves, let alone about their often-elusive nature. In addition to being critical of the field's apparent quest for replicability at the expense of learning about the processes by which psi occurs, he also repeatedly questioned some of the "traditional" assumptions that many of us continue to hold about psi operating in its discrete forms (e.g., telepathy, clairvoyance) or, for that matter, whether these phenomena are perceptual or even cognitive in character (see his presentation of the conformance model, Stanford, 1978). As he often would convey to me, we know very little about what psi really is, whether there is even a psi 'signal' and, if there

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is, what might be the mechanism by which we generate it, send it out, receive it, process it or how it travels through space-time.

Those who knew Rex, whether through attendance at parapsychology meetings, as editors, or as authors of books reviewed by him are probably aware that Rex was known for not shying away from offering critical commentary. This approach was never about grandstanding at the expense of others, but about his conviction that the primary purpose of our work as scientists is to understand the phenomena we are studying. Thus, his penchant for thoroughness and for identifying potential weaknesses extended even to his own carefully designed, methodologically "air-tight" studies. It is no wonder that Rex was a highly sought-after reviewer for books or referee for journal articles. I always felt that his conviction of the reality of psi, his methodological rigor, and his critical approach to all facets of research and scholarship were all well-suited characteristics for the presentation of a controversial area of research, especially when addressing non-parapsychological audiences who are likely to be overly skeptical. One example of this situation that readily comes to mind occurred in the early 1980s when during my graduate studies at Rutgers' former Institute for Cognitive Studies I had the opportunity to secure an invitation for Rex to be a colloquium guest speaker. Upon hearing about the invitation, and given the generally skeptical climate at Rutgers, our colleague Len Brosgole, suggested that he come along as a guest audience in support of Rex. Len had been a former student of my dissertation advisor, John Ceraso, when they were both at a different university. Moreover, Len also knew some of the other faculty members at Rutgers and was highly regarded by that group. But Rex was in complete command of his audience and his presentation was nothing short of dazzling. During the question-and-answer period, he provided thorough responses to the few questions that were raised and though as I later discovered most of the audience remained skeptical of the concept of psi, typically dismissing it a-priori, and of parapsychology as not being a legitimate scientific line of inquiry, no one could identify any flaws in his research. Rex had left them no room for criticism.

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Two other activities that Rex enjoyed very much were opera and bird watching. Rex and Birgit, the love of his life, who passed away in October 2018, were frequent audience members at the New York's Metropolitan Opera. Rex tried his best to get me interested in this art form, but as a die-hard fan of various varieties of Rock and Roll, my younger ears and brain were simply not primed for opera. I do admit that as I got older and began to better appreciate classical and other forms of music, I regretted not having taken advantage of the opportunity to have an opera connoisseur such as Rex introduce me to that world. Bird watching was a different story, and I was happy to go on several bird-watching trips with Rex and Birgit to some local nature preserves in the New York-New Jersey area, especially Jamaica Bay, Brigantine, Turkey Swamp, and several other hot spots for birding. Rex was particularly fond of shore birds. Indeed,, his personal email was the scientific name for a species of sandpiper, a small shore bird often seen in key areas of Texas during its Spring and Fall migrations, and whose long-distance travels take them from its wintering grounds in southwestern segments of South America all the way to its breeding grounds in Canada's and Alaska's Arctic areas.

Rex was exceptionally generous with his time and during that entire year that I was his GA we spent many hours in his office or in the lab discussing all sorts of issues of mutual interest, including, of course, matters related to parapsychology, science, and a myriad of other topics beyond those related to my specific duties as his GA. After I graduated from SJU and went over to Rutgers for my doctoral studies, we remained in close contact with each other. In 1989 I joined the faculty of SJU at the smaller campus in Staten Island and began to spend more time with him, going to out to dinner about once a month, rooming together while attending conferences, etc. After retiring from SJU in 2007 and earning emeritus status the following year, Rex and Birgit moved back to his native Texas residing in the town of Weslaco at the time of his passing away. He continued

being active in parapsychology by writing articles, reviewing books, and refereeing papers until the very end of his life. Although we continued being in touch by phone on a regular basis, sometimes speaking as often as once per week, I am saddened by the fact that the last time I saw them in person was in late December of 2007 when they stopped by my house in New Jersey to initiate their long car drive to their new retirement home in Texas.

Rex Stanford leaves behind a long legacy of accomplishments in the field of parapsychology. In addition to many publications and conference presentations, Rex was an active member of the PA having been elected several times to the Board of Directors and twice as president. He was also an active participant in various PA committees and was particularly proud of having chaired the Committee on Professional Standards and Ethics that put together the PA's Ethical and Professional Standards for Parapsychologists (1980). His two-part series on ethics in parapsychology published in Psychology Review in the late 1980s (Stanford, 1988a,b) offered an overview of the various subtle and not so subtle ethical concerns related to human subjects protections and of various questionable research practices that are a source of increasing concern in the sciences. In fact, it was Rex's concern with personal and professional ethics and, especially, his modeling of such behavior, that was a major influence in my own interest and eventual specialization in the general area of research integrity, more specifically, responsible writing and publication practices.

In sum, Rex was a supportive mentor and valued friend who will be greatly missed by many in the parapsychological community. May his tradition of ethical and rigorous research and scholarship blossom not only in the hearts and minds of all current and future parapsychologists, but in the hearts and minds of all scientists and scholars across all disciplines.

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Daniel P. Brown (1948 -2022)

Barbara Easterlin[1]

On April 4, 2022, one of the great teachers and researchers in the field of consciousness studies, Daniel P. Brown, Ph. D., passed away after a long illness, through which he continued to work, tirelessly transmitting knowledge in the several areas in which he was an expert (see https://www.drdanielpbrown.com). Among his many domains of expertise, Dan was a major contributor to the fields of psychology, hypnosis, and meditation research. He was a remarkable person, completing his undergraduate degree in molecular biology at the University of Massachusetts, Amherst and his Ph. D. in Religion and Psychological Studies at the University of Chicago before settling into a clinical psychology career that included early research on cognition, perception, and qualities of awareness. He was affiliated with Harvard University as a professor, training director, and researcher for the entirety of his professional career. Of the 24 books he authored or co-authored, several were considered foundational clinical hypnosis texts, including, with Erika Fromm, *Hypnotherapy and Hypnoanalysis* (1986) and *Hypnosis and Behavioral Medicine* (1987), and a *Festschrifft for Erika Fromm Creative Mastery in Hypnosis and Hypnoanalysis* (Fass & Brown, 1990). In addition, he was the senior author of a major textbook on the treatment of attachment disorders in adults, *Attach-*

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https://doi.org/10.31156/jaex.24353

ment Disturbances in Adults (Brown & Elliot, 2016), and authored two books on developmental psychopathology: a text on affect development, *Human Feelings* (Ablon et al., 1993), and one on self-development from a contemplative perspective, *Transformations of Consciousness* (Wilber et al., 1986).

A fierce protector of innocence, Dan also provided forensic psychology expertise to hundreds of child abuse cases, notably many by clergy, resulting in justice for many survivors around the world. As an expert witness and consultant on trauma and memory, he testified before the International War Crimes Tribunal for the Prosecution of war criminals of the former Yugoslavia. His testimony helped establish the standard of evidence for evaluating the reliability of memory for severe war atrocities. His testimony also contributed to three state supreme court cases on the reliability of children's testimony regarding sexual abuse. His text *Memory, Trauma Treatment and the Law* (Brown et al., 1998) was the recipient of awards from 7 professional societies, including the 1999 Manfred S. Guttmacher Award given jointly by the American Psychiatric Association and the American Academy of Psychiatry and Law for "Outstanding Contribution to Forensic Psychiatry."

In addition to his work in the fields of clinical hypnosis, attachment, and forensic psychology, Dan studied and mastered many meditation practices, including Patanjali's Yogasutras in the original Sanskrit, Burmese mindfulness, Indo-Tibetan concentration and insight meditation, and Mahamudra. During his 47 years of practice, he made important cultural contributions, translating many meditation texts from Tibetan and Sanskrit and offering these teachings in retreat settings to thousands of students over the past 3 decades. Dan was a pioneer in integrating Eastern methodologies of consciousness development with Western models of health (e.g., Brown & Engler, 1980). Notably, he spent 10 years conducting outcomes research on beginning and advanced meditators, with an emphasis on researching the effects of intensive concentration meditation and the nature of the awakened mind. This is how I first met Dan -- when I was a graduate student some decades ago – I asked him if I could use his Profiles of Meditation Experience (POME) scale. Graciously, he treated me as a young colleague and only asked that I validate the shortened scale I had proposed and send him the results. He was generous with his knowledge, precise in his work, and encouraged that same meticulousness in colleagues and students. In addition to his professional contributions, Dan had a deep sense of decency and integrity. All of these qualities made people want to learn from him and remain in his sphere, wherever possible. Above all, Dan was devoted to his sons and his wife, Gretchen who, along with his many students, colleagues, collaborators, patients, and friends, will deeply miss his beautiful and brilliant presence.

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Brenda J. Dunne (1944-2022)

Herb Mertz[1]

Brenda Dunne, ca. 1982

Brenda Dunne, the long-time laboratory manager of the Princeton Engineering Anomalies Research (PEAR) program at Princeton University, passed away on June 17, 2022. She studied developmental psychology, receiving a Master's degree from the University of Chicago in 1979. During this period, she also conducted studies in remote viewing. At a conference on this subject, she met Robert Jahn, a professor and dean of Princeton University's engineering school. Jahn had recently become interested in anomalous events based on positive results in a mind-matter interaction study conducted by one of his undergraduate students. Upon meeting Brenda, Jahn felt that she was the ideal candidate for manager of his proposed laboratory at Princeton.

Brenda arrived in Princeton in 1979 to design the PEAR lab as a friendly place for staff and volunteers to explore mind-matter interaction, remote viewing, and other anomalies. The lab operated for 28 years, with the PEAR program often cited as foundational to the field of anomalies, beginning with the landmark 1979 symposium sponsored by PEAR and the American Association for the Advancement of Science (AAAS) on The Role of Consciousness in the Physical World. Brenda authored or co-authored many of the over 60 publications, as well as four books co-written with Jahn, including *Margins of Reality*

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https://doi.org/10.31156/jaex.24465

(1987) and *Consciousness and the Source of Reality* (2011). Both were summaries of the PEAR work, which helped develop new protocols for remote viewing studies and carried out 25 years of highly significant RNG studies. Furthermore, one of her papers showed RNG data-position effects, with participants getting good results at the beginning which persistently declined over time (Dunne et al,. 1994), and another showing consistent gender effects in Random Event Generator experiments (Dunne, 1998)

During the 1980s Brenda became a founding member of the Society for Scientific Exploration (SSE), a professional association, and in 1990 she co-founded the International Consciousness Research Laboratories (ICRL), a non-profit educational organization for furthering research and publishing books related to anomalies, with the goal of developing interest in the public. In 2007 the lab closed, and Brenda and Jahn moved ICRL into the town of Princeton where ICRL continued to sponsor research and publish books. In early 2022 Brenda received an honorary Ph. D. from Ubiquity University.

Brenda Dunne had a particular interest in developing young research minds for the field of anomalies. She enticed the next generation into discussions at SSE conferences, offering free pizza lunches to inquiring minds. For all of us who knew Brenda, she was a spellbinding storyteller and a warm presence in the field. Truly a bright light went out of this world with her passing. Brenda is survived by her son Jeff (now Executive Director of ICRL), daughter Jessica, and seven grandchildren.

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Some Conceptual and Empirical Shortcomings of IIT[1,2]

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[Editor's note: The author of this paper first submitted it to the special issue of *Frontiers in Human Neuroscience* that is described in this issue by Weiler et al. The first review he got within a month recommended publication and suggested, but not required, changes. He could not get another review for 6 months, at which point he withdrew it and submitted it to *JAEX*].

Abstract: The Integrated Information Theory of consciousness (IIT) has generated much excitement inside and outside the scientific community, and seems to many the leading contender for a satisfactory theory grounded in systems neuroscience. It is a bold theory, one that provides plausible explanations for various recognized neuroscientific facts, makes surprising predictions that go beyond current scientific orthodoxy but are potentially testable, and has inspired development of what appears to be an effective technique for detecting the presence of consciousness in organisms incapable of verbal report, such as non-human animals, neonates, and severely brain-damaged adults. Despite these virtues, IIT appears fundamentally flawed: This paper first revisits some key conceptual and technical issues that have been raised previously but remain unresolved—in particular, issues concerning IIT's concept of "information" and its approach to the "hard problem"—and then focuses on several empirical phenomena that IIT seems unable to handle satisfactorily. These include: 1. cases of multiple personality or dissociative identity disorder in which complex and overlapping centers of consciousness co-occur in single human organisms; 2. the failure of the intense phenomenology of psychedelic states to be straightforwardly reflected in accompanying neuroelectric activity; and, most critically; 3. the occurrence of profound and personally transformative near-death experiences (NDEs) under extreme physiological conditions such as cardiac arrest, in which IIT predicts that no conscious experience whatsoever should be possible. These empirical arguments show that IIT itself is untenable, and they apply also to its physicalist competitors. Scientifically and philosophically respectable alternatives, however, are available.

Keywords: consciousness, hard problem, reductionism, materialism, realist idealism, MPD/DID, psychedelic neuroimaging, NDEs

Highlights

- Sketches the history and main features of IIT.
- Pinpoints several conceptual weaknesses of IIT.
- Identifies empirical phenomena that falsify IIT and its physicalist competitors.
- Provides pointers to scientifically and philosophical alternatives to the prevailing physicalist "production" model of consciousness.

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[2] The author thanks Eben Alexander, Etzel Cardeña, Adam Crabtree, Patrick Fowler, Bruce Greyson, Mike Grosso, Bernardo Kastrup, Emily Kelly, Paul Marshall, Michael Nahm, David Presti, Bob Rosenberg, Richard Silberstein, Andreas Sommer, and Max Velmans for helpful comments on earlier versions of this paper.

Journal of Anomalous Experience and Cognition
(JAEX) 2022, Vol. 2, No. 2, pp. 223-263

https://doi.org/10.31156/jaex.24123

The scientific and philosophical study of consciousness was well underway by the early 20th century, in the hands of people such as William James and Henri Bergson, when it was abruptly derailed (and American experimental psychology in general overtaken) by the misguided radical behaviorism of James B. Watson and his followers. Even as late as the 1960s, when I was a graduate student in psychology, the word "consciousness" was rarely spoken in polite scientific company. That aversion has now largely subsided, mercifully, and consciousness research is once again flourishing.

One central aspect of this contemporary renaissance is the emergence of a number of neuroscience-based theories of consciousness, which though differing in many details are generically similar in overall form. Specifically, they all portray the ongoing fluctuations of everyday consciousness as arising from, or at least being closely tied to, dynamically evolving large-scale patterns of neuroelectric activity spanning a widespread core brain system consisting of the thalamus and the interconnected neocortical territories with which it is massively and reciprocally connected.

Integrated Information Theory (henceforth IIT) has become in the eyes of many the leading contender among such theories. This is certainly due in part to its high-profile provenance: Its principal developer, Giulio Tononi, began working on the theory in the 1990s, during his tenure at the Neurosciences Institute in La Jolla with Nobel laureate Gerald Edelman, and he has subsequently been joined in its further development and promotion by Christof Koch, another prominent neuroscientist and the principal protégé of Nobel laureate Francis Crick. Together with various other colleagues, Tononi and Koch have produced numerous papers and books about IIT, and have recently created a nonprofit foundation (Tiny Blue Dot) which seems devoted principally to its promotion. IIT has

also evidently become the principal driver of the ongoing "adversarial collaboration" among competing neuroscientific theories of consciousness funded by the Templeton World Charities Foundation. Despite its current popularity, however, IIT seems to suffer some very significant liabilities, both conceptual and empirical. To these I now turn, starting with a brief description of the theory itself.

A Very Brief Sketch of IIT

The beginnings of IIT can be found in Edelman & Tononi (2000) and the distillation by Edelman (2003) of its underlying theoretical framework, but the theory has evolved significantly since that early period as Tononi and his later colleagues have progressively elaborated and formalized that original systems-level approach to the neurobiology of consciousness. The historical development can be traced through the accounts provided in Balduzzi & Tononi (2008, 2009), Koch (2012, 2019), Koch et al. (2016), Oizumi et al. (2014), Tononi (2004, 2008, 2012, 2015), Tononi & Koch (2015), Tononi & Laureys (2009), and Tononi et al. (2016). The current version—"IIT 3.0"—was initially set forth by Oizumi et al. (2014) and is described also in Koch (2019) and Tononi (2015). Here I will not describe the theory in detail, but seek only to convey enough of its flavor to provide context for the critical remarks to follow.

IIT begins by attempting to characterize the essential phenomenological properties of conscious human experience (its "axioms"), and then seeks to infer what properties of a physical system such as the brain could potentially support, correspond to, or perhaps "explain" those phenomenological properties (its "postulates"). Following Tononi (2015), IIT's current axioms have been formulated in accordance with the governing principles that they should be about conscious experience itself; self-evident, or immediately given and not requiring derivation or proof; essential to all conscious experience; complete as a set, and thus leaving out nothing vital; consistent, or free of internal contradictions; and independent, in the sense that none can be derived from any combination of the others.

IIT currently recognizes five such axioms. Ever so briefly, intrinsic existence captures the fact that every moment of consciousness is inherently actual or real and experienced from a particular subjective point of view. Composition points to the structure of conscious experiences, which typically incorporate multiple phenomenological properties and distinctions. Information refers to the specificity of each individual experience, which allows it to be differentiated from many others that might have occurred but have not. Integration refers to the unity of each conscious experience, the fact that its potentially many parts are experienced simultaneously as a unified whole. Exclusion means essentially that only one such experience can occur at a time. Note in passing that Edelman & Tononi (2000) had recognized just two principal features of conscious experience, differentiation and integration, and that these remained the key features as late as Koch (2012, pp. 125-126).

IIT holds that for each of its axioms there must be a corresponding property of a physical system such as the brain that can support or account for it. Again, very briefly, intrinsic existence is claimed to arise in connection with any physical system that has causal power over itself (see below, however, for more on this). Composition reflects the fact that the elements of such a system can be co-activated in many possible combinations or subsets. Information or differentiation depends on the size of the repertoire of possible states that a system can assume, and is measured in terms of the degree to which its present state constrains its own past and future states relative to that total

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repertoire. Integration is effected through causal interactions among the parts of a system, and reflects the irreducibility of its current overall state to interactions among independent subsets of those parts. Exclusion results from the winner-take-all character of system operation, requiring that intrinsic existence be associated only with the sub-state of the current overall state that is maximally irreducible from the perspective of the system itself, neither more nor less.

For more detailed explanations of these complex, difficult, and still-evolving basic concepts so fundamental to IIT, readers should consult the original sources identified above. Their formal development has resulted in three further aspects of IIT that are important for my purposes here. First and most widely known is an information-theoretic quantity termed PHI (Φ, rhymes with "eye"), conceived as the amount of information generated by a system above and beyond that generated by its parts, and understood as a measure of the overall amount of conscious experience associated with the current state of a physical system. Second, and much less well developed, is the notion of a "qualia space," in which the physical substrate of each conscious state exhibits a geometric structure that determines its qualitative character and semantic relations to other such states (Balduzzi & Tononi, 2009). Third is IIT's "Central Identity"—an ontological commitment to identity between a given conscious experience and the maximally irreducible cause-effect structure associated with the system in that state, as embodied in the complex that maximizes Φ (Koch, 2019, pp. 87-89; Oizumi et al., 2014, p. 3).

Development and refinement of the theory has taken place over several decades, using a variety of methods including mathematical formalization of key quantities such as Φ and the study of their behavior in computationally tractable "toy" systems constructed deliberately to exemplify various structural arrangements known to exist in

mammalian nervous systems, together with computer simulation studies using increasingly large and realistic model neural networks. One central and very encouraging cumulative result of these efforts has been to show that larger values of Φ occur systematically in conjunction with what are called "small-world" network architectures that combine dense local connections with much sparser long-distance connectivity (Watts & Strogatz, 1998)—precisely the kind of architecture characteristic of mammalian nervous systems (Edelman & Tononi, 2000). The theory thus appears consistent in important respects with known neuroanatomy and neurophysiology. As explained in more detail in the references cited above, it also provides seemingly plausible explanations for various recognized neuroscientific facts. These include, for example, the normal co-occurrence of unified conscious experience with large-scale coordination across cortical domains of brain neuroelectric activity; the relatively minor contribution to consciousness of structures such as the spinal cord, and more importantly the cerebellum with its relatively enormous neural population; the loss of consciousness during general anesthesia, epileptic seizures and deep sleep; and the presence of consciousness during REM sleep.

Surprisingly to me, and controversially, Koch (2012) repudiated his own more conventional earlier views by explicitly rejecting emergence and reductionism in regard to consciousness (p. 119), even going so far as to embrace panpsychism (pp. 131-135). Tononi and Koch (2015) later relaxed that embrace somewhat, perhaps in response to ridicule of it by Searle (2013), but it remains true that IIT, precisely because of its conception of the interiority available to self-influencing physical systems, sees consciousness as far more widely distributed in nature than most scientists have previously imagined. IIT's ultimate philosophical position in regard to the mind/brain relation remains unclear to me, but despite the "Central Identity" noted above it seems (arguably) a constitutive panexperien-

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tialism, or perhaps a form of property dualism—positions that recognize irreducible mental properties but view them as depending or supervening on conventional physical properties. Their theory also verges on epiphenomenalism, in that they say very little about what consciousness does, and instead speak almost exclusively about what it's like—essentially a passive accompaniment to the corresponding physical state. The architects of IIT should really be pressed to locate it more precisely within the broader landscape of relevant philosophical possibilities (Marshall, 2021).

Let me immediately acknowledge here, in concluding this brief and inadequate description, that I find a great deal to admire in the work that has gone into the development of IIT. As will become clearer below, I also believe that IIT is correct in taking conscious experience itself as its starting point, in explicitly rejecting emergence and reductionism, and in viewing consciousness as a fundamental feature of nature. At the same time, I also see significant conceptual and empirical problems with the theory in its current form, and turn next to discussion of these.

Conceptual Issues with IIT

The axiomatic foundations of IIT 3.0 have been examined in depth from a philosophical perspective in an important paper by Bayne (2018), who discusses the axiomatic approach in general (which he finds ill-suited to the study of consciousness); the five current IIT axioms individually (which he thinks generally fail to qualify for their intended roles); the unclear logical form of their relationship to the postulates (which is neither deduction nor induction but something more like abduction—read, "guesswork"); and their limited capacity to provide constraints upon a supposedly general theory of consciousness (which results from the near-exclusive focus on human or at least mammalian consciousness). Bayne himself concludes, correctly in my opinion, that the axiomatic foundations of IIT are, in short, "shaky" (p. 7), and Merker et al. (2022), expanding on Bayne's analysis, agree. Here I wish only to discuss a few further points of special interest to me.

One important feature of human conscious experience conspicuously absent from IIT's current axioms is intentionality, the capacity of conscious thoughts and experiences to be "about" or "directed toward" things, events, or states of affairs in the external or internal world. Tononi (2015, footnote 3) explicitly touches upon intentionality as a possible candidate axiom, but immediately dismisses it on grounds that it is (arguably) not a property of all conscious experience. Surely this is too glib. Many ongoing discussions in philosophy of mind revolve around the work of 19th century Austrian philosopher Franz Brentano, who argued that intentionality is *the* mark of the mental, present in all experience, and—more fundamentally—that it is not achievable by any physical system. The jury is still out regarding the universality of intentionality (especially in relation to bare sensory or affective experiences of various kinds), but attempts to naturalize it—that is, to explain it in purely physicalist terms—have generally failed. In sum, whether or not it is present in all experience, intentionality surely must be addressed head-on by any serious theory of consciousness, and IIT has not yet done so. For a lucid and compact introduction to this large literature see Jacob (2019).

Next comes the vexed subject of "information," and the manner in which differing conceptions of information have entered into IIT. Like many other contemporary psychologists and neuroscientists, the developers and expositors of IIT have tended to conflate the technical and everyday meanings of that widely abused term. The technical sense (Shannon & Weaver, 1963) is purely syntactical, and applies strictly to situations in which elements are being drawn with known probabilities from a finite set and sent from a source to a receiver through a noisy channel. The everyday sense, on the other hand, revolves around the meaning or semantic content of conscious experiences and the repre-

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sentational forms such as language and visual imagery with which consciousness routinely operates.

Now, in Edelman & Tononi (2000) the information content of any conscious experience was repeatedly and insistently identified in purely Shannon-like terms with the number of alternative possible experiences ruled out by its occurrence. That identification persists at least as late as Tononi & Laureys (2009, pp. 402-403) and Koch (2012, p. 125), but it is surely incorrect. For one thing, all experiences would be more or less infinitely "informative" in that sense, considering for example that one's world of possible experience might consist just of positive integers, or of real numbers in the interval between zero and one. More importantly, what we normally have in mind in talking about the "information" contained in a conscious experience is surely information in the everyday sense—what that experience itself tells us in positive terms about "what's going on" in our environment.

IIT has by now moved away from Edelman's original view, but not entirely. What we have currently is a kind of hybrid conception: For purposes of calculating an amount of integrated information (Φ), IIT uses a Shannon-like measure of the reduction in uncertainty about the past and future states of a physical system that its current state affords, which can also be understood as a measure of the degree to which the system both affects and is affected by itself. Parenthetically, Bayne (2016) and Pautz (2019) have independently questioned whether it is even meaningful in general to characterize states of consciousness in terms of an overall level or amount of consciousness. Meanwhile, the semantic content or meaning of a conscious state is said to be represented by the geometric structure of its physical substrate in the associated high-dimensional qualia space, in effect translating similarities of meaning into similarities of shape (Balduzzi & Tononi, 2009; Oizumi et al., 2014, supplement; Koch, 2012, pp. 130-131; 2019, pp. 87-89). That latter part of the theory remains relatively undeveloped and exceedingly abstract, and without going into details I have serious doubts about the possibility of developing it in a usefully general form even for relatively simple sensory qualia (see also the second part of Pautz, 2019). Furthermore, even if this could be done, the associated "Central Identity" of IIT—the claim that the semantic content of any conscious experience is equivalent to the geometric shape of the corresponding cause-effect structure in qualia space—seems subject to objections like those of Kripke (1980), who argued essentially that two things cannot be identical if there is anything on one side of the equation not present on the other.

There is something fundamentally unsatisfactory about IIT's approach to the "hard problem," and this lies at the bottom of what troubled philosopher John Searle (2013) in his review of Koch (2012). Searle saw clearly that IIT was attempting to explain consciousness in terms of information in the everyday sense, and argued—correctly, in my opinion—that this is completely circular because information in that sense presupposes consciousness and hence cannot be used to explain it (see also the attempted rebuttal by Koch & Tononi and a further reply from Searle in the March 7, 2013 NYRB). Searle himself left the matter there, but subsequent developments on the IIT side, possibly stimulated by his critique, have made clear exactly how and where consciousness surreptitiously enters the system. Specifically, both Tononi (2015, footnote 7) and Koch (2019, pp. 80-81 and note 3) attempt to justify IIT's crucial first postulate—intended to explain how a physical system can have "intrinsic existence," an associated conscious state organized from its own subjective point of view—by appeal to a Platonic dialogue, Sophist. In that dialogue, the Eleatic Stranger convinces his interlocutor that for anything to be or exist extrinsically—that is, from the point of view of an external observer—all it needs is to have causal power to affect other things. Taking this as their authority, both Koch and Tononi immediately infer that for a physical system to exhibit intrinsic existence of the sort specified by IIT's axiom 1, all it needs is to have causal power over itself—that is, to affect (and be affected by) itself.

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That "inference," I submit, is itself pure sophistry. Plato's observer, after all, is already a conscious being, in full possession of intrinsic existence, who is examining something external to himself. The simple fact that a given physical system causally affects itself cannot possibly guarantee interiority of any kind to that system. Coming at this same issue from a different direction, computer scientist Scott Aaronson (2014) demonstrated that simple arrays of logic gates can have non-zero values of Φ, and can be expanded in ways that raise Φ to arbitrarily high levels potentially exceeding those of our own human brains. Whereas Aaronson sees this result as constituting a reductio ad absurdum of the basic premises of their theory, Koch and Tononi take it as a surprising discovery about the distribution of consciousness in nature. Seth et al. (2006) had provided a similar demonstration much earlier, and in Edelman's own lab, but its implications were evidently ignored at the time. Merker et al. (2022) have expanded significantly on Aaronson's theme, but the basic point remains the same.

Additional problems have emerged on the practical side. Calculation of Φ from its formal definition has proved possible only for very small systems, because of a combinatorial explosion in the number of partitions of the system's elements that must be examined. Application to real systems such as brains is further complicated by unclarity about the proper choice of system "elements," which in this case might plausibly be anything from say single neurons to cortical minicolumns or columns, cytoarchitectonic areas, recognized cortical and subcortical "modules" of some sort, or even just the geographic territories underlying a set of EEG electrodes. Barrett & Mediano (2019) have pointed out several further ways in which Φ fails to be well-defined for general physical systems. A number of computationally more tractable approximations have been developed by mathematicians, and further work is underway to explore and refine these, but so far they have tended to behave in mutually inconsistent ways, and at present there is no agreed-upon best way to calculate Φ itself for realistic systems in accordance with its formal definition in IIT (Barrett & Seth, 2011; Mediano et al., 2019).

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Meanwhile, however, a separate development associated with the same group but much more loosely tied to the formal theory has proved remarkably successful. I refer here to work on the "Perturbational Complexity Index" (PCI), introduced by Casali et al. (2013) and described more fully by Massimini & Tononi (2018). Their "zap & zip" method is complex in technical detail but straightforward conceptually, using transcranial magnetic stimulation (TMS) to probe the core thalamocortical system directly (bypassing sensory and motor systems and requiring no overt response from the subject), and measuring the brain's consistent response on a subsecond scale using sophisticated multichannel EEG techniques. TMS pulses (the zaps) are applied repeatedly at a particular scalp location, EEG responses averaged and significant cortical sources identified, and the total "complexity" of the cortical response measured using a standard algorithm for data compression (the zip), resulting ultimately in a real number between zero and one. In an international collaboration spanning many years, and including both normal participants in a variety of states (awake, REM sleep, NREM sleep, plus several kinds of anesthesia) and brain-damaged participants of various kinds (stroke victims, plus minimally conscious and locked-in patients), this IIT-inspired research team was able to show in a benchmark sample of 150 cases that a threshold PCI value of .31 discriminated perfectly between conscious and unconscious states—that is, with 100% sensitivity (no false negatives) and 100% specificity (no false positives). Note that this sample included some persons who were unable to report being awake at the time of testing but could do so later, such as locked-in patients who later recovered and normal individuals exposed to subanesthetic doses of ketamine.

These initial results with the PCI may not hold up perfectly in future work, inasmuch as a dozen or so of the 150 benchmark cases lie perilously close to the magical .31 boundary (Massimini & Tononi, 2018, p. 124), but they are already of potentially great practical significance, and further work is underway to optimize various parameters of the technique such as the locus, magnitude and rate of stimulation and details of response measurement. What is most significant for my purposes here, however, is the loose connection to IIT proper: The PCI does not rely at all on the formal definition of Φ, but instead more directly captures what Edelman & Tononi (2000) had originally identified as the two most critical properties of large-scale patterns of neuroelectric activity in their "dynamic core" (the thalamocortical system)—differentiation and integration. In essence, PCI grows large when TMS-driven neural activity spreads in differentiated form to remote locations, but assumes low values either if the response remains localized, or if it spreads widely but only in undifferentiated or stereotypical form.

This saga of Φ versus the PCI exemplifies something that for me has come to seem characteristic of IIT in general as a theory—specifically, that what is really new (the elaborate formalism) is not all that useful or good, while what is really good (directly measuring relevant complexities in brain activity) is not all that new. I turn next to additional challenges to IIT of empirical sorts.

Empirical Issues

Disconnection Syndromes and the IIT Exclusion Postulate

The IIT exclusion postulate essentially asserts that a physical system such as the brain can normally accommodate just one conscious state at a time—specifically, the conscious state associated with whatever sub-state of that system maximizes Φ. Note that this picture is consistent with the prevailing modern view in psychology and neuroscience that everyday consciousness is normally all the consciousness there is, supported by various fast, massively parallel, and unconscious forms of brain activity. What does IIT predict, then, if parts of the underlying physical system cease to interact in normal ways?

There are two main types of cases to consider. The first involves anatomical disconnection, in particular the disconnection of cerebral hemispheres effected by drastic "split-brain" surgeries in epileptic patients, which are carried out rarely and as a last resort to prevent interhemispheric spread of seizures in otherwise intractable cases. In this situation, IIT clearly predicts that the result will be two distinct conscious minds or personalities inhabiting the same skull, and developers and proponents of IIT from Edelman & Tononi (2000) onward, relying primarily on the early work of Roger Sperry and Michael Gazzaniga, have generally acted as though this is an established fact. In reality, however, the results of such surgeries are much more complicated and uncertain. The early work certainly established that the left and right hemispheres have specialized abilities that can only be revealed by careful behavioral testing. Things also definitely happen that seem potentially consistent with the two-minds picture, such as the patient blushing when the nonverbal right hemisphere is shown an embarrassing photo that the verbal left hemisphere denies having seen, or when the left hand tries to interfere with something the right hand is doing. But the overwhelming impression of most observers—including, importantly, the patients themselves—is that practically nothing has changed. It was recognized early on that appearances of persisting unity might simply reflect incomplete separation of the hemispheres through sparing of structures such as the anterior and posterior commissures, but this cannot account for all cases, and substantial scholarly arguments for continued unity have been advanced for example by John Eccles (Popper & Eccles, 1977, chapter E5), Pinto et al. (2017), and Nagel (1979). Even Michael Gazzaniga himself has more recently expressed uncertainty about the actual state of things, particularly in regard to the mute right hemisphere (Gazzaniga & Miller, 2009). In sum, the exist-

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ing split-brain cases are so complicated that we do not really know at this point how best to interpret them (de Haan et al., 2020). See also Nahm et al. (2017) for some cases of related type such as hemispherectomies. Koch (2019, pp. 108-111) also brings up the interesting subject of unusual connection syndromes, as for example between the brains of craniopagus conjoined twins. Such cases are if anything rarer and more complicated than the split-brain cases, but some may be particularly difficult for IIT: The long-lived Schappell twins, for example, are conjoined at the frontal lobes yet have distinct streams of consciousness and drastically divergent minds and personalities.

Cases of the second type, involving functional disconnection, are both more common and more clear-cut in their implications. I refer here in particular to the large literature concerning "multiple personality" or "dissociative identity" disorders (MPD/DID), in which two or more distinct personalities or streams of consciousness appear to be associated with a single biological organism. IIT recognizes the possibility of such cases, but places severe restrictions on their possible form due to its exclusion postulate. In particular, the physical substrate of any stream of consciousness operating concurrently with the main or dominant stream—the everyday conscious self—cannot overlap with that of the dominant stream. Furthermore, it will in general be diminished in complexity relative to that main complex, and hence capable only of supporting a correspondingly reduced secondary consciousness (Koch, 2019, p. 112).

These predictions of IIT, and that mainstream modern picture of the psyche more generally, are challenged by facts that had already come to light during the rich but now largely forgotten early history of dynamic psychiatry, with its demonstrations that "unconscious cerebration" could not fully account for the properties of psychological automatisms and secondary personalities (Crabtree, 2007; Ellenberger, 1970). Secondary centers of consciousness often appear to be full-scale minds or personalities at least on par with the normal waking self. They also sometimes clearly operate concurrently with

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that self, rather than simply alternating with it, and share with it fundamental cognitive capacities such as linguistic fluency, which implies that the associated neural substrates almost certainly overlap. They are also sometimes conspicuously more complex and able than the primary personality, as for example in the extraordinary case of Patience Worth (Prince, 1964). In addition, and worst of all from the point of view of IIT, "alter" personalities A and B sometimes display an asymmetric form of co-consciousness such that B is aware of much that goes on in A's conscious experience at the time it is happening, but not vice-versa (Braude, 1991; Janet, 1889; Prince, 1908).

British psychical researcher F. W. H. Myers (1903) drew upon these and other unusual human psychophysical capacities to develop an expanded picture of human personality in which the everyday consciousness is included within a normally hidden consciousness of greater capacities and wider scope to which it typically has little or no direct access. Analytical philosopher Stephen Braude (1991) arrived independently at essentially the same picture, and specifically in relation to cases of multiple personality. It has not yet been adequately appreciated that William James deliberately and explicitly adopted Myers's model for his own explanatory purposes in The Varieties of Religious Experience, and that a century-plus of subsequent research has strengthened the evidence supporting it on multiple fronts including MPD/DID as well as extreme psychophysical influence, some key properties of human memory, near-death and related experiences, genius, and mystical experience, as shown in Kelly et al. (2007). This more inclusive subliminal consciousness is precisely the "entirely unsuspected peculiarity in the constitution of human nature" to which James alludes in Chapter 10 of VRE, drawing upon the work of Myers, Janet and Binet. In an address to the Society for Psychical Research, of which he was a member, Sigmund Freud later characterized Myers's construct—incorrectly—as amounting to an "unconscious conscious." See Crabtree (2007, pp. 327-332) for a detailed account. As will soon become evident, this expanded psychological model has deep con-

nections with our remaining topics as well. Much more is at stake here than just IIT's exclusion postulate.

Psychedelic Neuroimaging

The recent renaissance of research on psychedelics (Pollan, 2018), coupled with decades of advances in functional neuroimaging technology, has opened a path toward well-controlled experimental investigation of mystical states of consciousness and their physiological accompaniments. Surely, for persons like Myers and James, this amounts to a scientific dream come true, the possibility of studying brain-mind correlation across an unusually wide range of conscious states. The subject is still in its infancy, but surprising and challenging results have already come to light.

The natural if perhaps naïve expectation is that the intense phenomenology of psychedelic experiences will likely be accompanied by some sort of parallel intensification readily observable in accompanying patterns of neural activity. This expectation seemed to be confirmed early on by experiments using oral doses of psilocybin in conjunction with positron emission tomographic (PET) neuroimaging (see Kelly et al., 2007, pp. 542-553). But then came the study by Carhart-Harris et al. (2012), who used venous injection of psilocybin in combination with two kinds of functional magnetic resonance imaging (ASL and BOLD fMRI, for measurement of blood flow and blood oxygenation, respectively), thereby enabling efficient tracking of a shorter-lasting but intense psychedelic state using neuroimaging techniques having far better temporal and spatial resolution than PET. Most observers including Christof Koch were shocked by the results (see https://www.scientificamerican.com/article/this-is-your-brain-on-drugs). No increases in activation were observed anywhere in the brain. Instead, prominent decreases were observed, most strikingly in a brain system called the Default Mode Network (DMN), which is known to be especially active in the resting state and which in effect represents the neural embodiment of the Freudian ego (Carhart-Harris & Friston, 2010). Major nodes or hubs of the DMN such as anterior and posterior cingulate cortex (ACC and PCC), medial prefrontal cortex (mPFC) and thalamus were strongly deactivated, with average reductions on the order of 10-15%, and the reported intensity of the experience correlated positively and strongly with the magnitude of those reductions. The DMN also appeared to lose functional integrity, with mPFC and PCC in particular becoming decoupled. A subsequent study from the same group using the same drug protocol in conjunction with magnetoencephalographic (MEG) neuroimaging revealed sharp decreases in oscillatory power across a wide range of frequencies in the same cortical regions (Muthukumaraswamy et al., 2013), and similar effects have more recently been found in a number of further studies by the same and other research groups, and using additional agents such as DMT/Ayahuasca, LSD, and ketamine (Palhano-Fontes et al., 2015; Carhart-Harris et al., 2016). These unexpected effects are large and robust, and I will return to them shortly.

Perhaps driven by their own theoretical expectations, the Carhart-Harris group in particular has continued to search, without much success, for something in the brain's neuroelectric activity that consistently increases in conjunction with the "higher" states of consciousness induced by psychoactive agents. That effort culminated, at least temporarily, in the publication of Schartner et al. (2017), the abstract of which states without qualification that they have found "reliably higher spontaneous signal diversity" in MEG signals accompanying states of consciousness induced by psilocybin, ketamine and LSD. That claim, however, is not warranted by the reported results, which derive from reanalysis of MEG data collected in previous experiments by the same group. Their measure of "signal diversity" is similar to the previously discussed Perturbational Complexity Index (PCI; Casali et al., 2013) in that it varies between 0.0 and 1.0 and reflects the complexity or incompressibility of the estimated cortical sources of surface-recorded data, but their technique is applied to individual 2-second segments of spontaneous MEG rather than to

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time-averages of responses to repeated TMS pulses (becoming, in effect, "zip-without-zap"). The key results appear in their Fig. 2. Mean diversities for the ordinary waking (placebo) conditions are all around .98 or slightly above. The mean diversities for the drug conditions are indeed all higher, but the differences between drug and placebo means are tiny in absolute magnitude—on the order of .005 or less—and not even statistically significant for psilocybin. For some participants in all drug conditions the mean differences from placebo are essentially zero, or sometimes even in the wrong direction, and the underlying raw diversity distributions all strongly overlap. The high significance levels reported for some statistical tests of the tiny differences between drug and placebo mean diversities were achieved only because of the extremely large Ns available for the tests—many hundreds to thousands, apparently, although they are not specifically stated in the report—and this depends upon the dubious use of serially correlated MEG segments rather than participants as the unit of analysis. In sum, signal "diversity" as these authors define it is hardly the robust discriminator advertised in the paper's abstract.

The fact that Schartner et al. (2017) did not succeed in identifying a genuinely robust discriminator does not entail that no such discriminator exists. It bears emphasis here that this leading-edge group, like many others, is working at the rapidly advancing frontier of functional neuroimaging technology, where everybody now understands clearly that the key to the whole subject lies in finding improved ways of characterizing and tracking large-scale neural dynamics on a time-scale relevant to experience and behavior. Numerous other EEG/MEG methods for doing that are either already available or under development somewhere, and perhaps one or more of those other methods can do a better job of detecting relevant changes in the brain activity induced by psychoactive substances. The PCI itself is certainly a good prospect, and was recommended also by Gallimore (2015), who used IIT to predict that psychedelics will result in increased diversity or differentiation, but argued that integration needs to be brought into the measurement

system as well (which of course the PCI implicitly does). Another good reason is that the maximum value of the PCI in ordinary waking states is only around .7 (Massimini & Tononi, 2018, p. 124), affording far more room for it to grow in "higher" states. Other candidates might include the many existing measures of multichannel signal "entropy"; the slope of the 1/f portion of the EEG power spectrum (thought to reflect the local balance of inhibition and excitation; He, 2014); "causal density" (average values of directed connectivity; Seth et al., 2008); global descriptors of multichannel signal amplitude, frequency and complexity (Wackermann & Allefeld, 2009); and others. The brute fact of the matter is that we do not yet have a very solid collective grip on optimal measures of neural dynamics and their relations to conscious experience. It is also true, given the well-known non-linearity of brain dynamics, that unimpressive-looking changes in measures of brain activity could potentially result in large functional effects. Nevertheless, for me as a long-time EEG researcher it remains profoundly surprising and puzzling, given the ease with which EEG discriminates between relatively mundane conditions such as waking and drowsy states, that it has so far proven so difficult to find anything in surface-recorded neuroelectric activity that distinguishes clearly and reliably between ordinary wakefulness and the extraordinarily intense and sometimes life-transforming states of consciousness induced by these psychoactive substances.

Meanwhile, the most robust finding to date is the relatively dramatic deactivation and fragmentation of the DMN produced by psychedelics (Seth et al. (2018) attempted to distance themselves from this finding, but co-author and group leader Carhart-Harris (2018, p. 174) subsequently reaffirmed it). Parenthetically, similar DMN-suppression effects have been found in advanced meditators by Brewer et al. (2011), and much additional evidence along the same lines can be found in Goleman & Davidson (2017, chapter 8).

What are we to make of all this? The full historical context for this question is spelled out in a valuable paper by Swanson (2018), who goes back as far as the 19th century and

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specifically includes early figures such as Myers, James and Bergson under the heading of "filtration" theorists, who interpret the profound psychological effects of psychedelics as incursions from deeper and normally hidden parts of the mind as a result of disruption of some sort of "filtering" or "reducing valve" mechanism that normally confines conscious mentation within limits adapted to the needs of everyday life. Such theorists have differed widely in terms of their conceptions of the nature of those normally hidden parts of the mind, with contemporary filter-type theorizing of course almost invariably seeking to understand everything in purely reductionist, brain-based terms. Drawing upon his own background in psychoanalytic thought, for example, Carhart-Harris has argued that the old but still-useful Freudian distinction between secondary and primary processes maps onto the distinction between ego-like functions exercised by the DMN and the activity of more primitive brain areas that it normally controls, and that by disrupting the DMN and thus "dissolving" the ego, psychedelics release sources of primary-process material distributed widely across other parts of the brain (Carhart-Harris & Friston, 2010; Carhart-Harris et al., 2014). This is their neuroscience-based version of a filter-type theory, which they believe is capable of accounting for all relevant mental phenomena including both pathological (such as pre-psychotic mentation) and supernormal (such as high forms of creative thinking). Carhart-Harris & Friston (2010) even congratulate themselves for "addressing topics which have hitherto been considered incompatible with the cognitive paradigm" (p. 1275).

Swanson (2018) adopts the same reductive point of view, presenting Carhart-Harris's "entropic brain hypothesis" (EBH) together with IIT and hierarchical predictive processing (HPP) as the principal current examples of filtration theories couched in contemporary cognitive neuroscientific terms (parenthetically, Carhart-Harris & Friston (2019) have more recently attempted to integrate EBH and HPP under the umbrella of a unified REBUS or "relaxed beliefs under psychedelics" model of psychedelic interactions, leaving IIT aside). All these theories presume, axiomatically, that everything that enters consciousness in richer-than-normal psychedelic or mystical states of consciousness must come from elsewhere in the brain, either directly (from whatever is already stored there) or indirectly (by way of our sensory surfaces). The earlier filtration theorists, however—including Myers, James, and Bergson—all felt compelled by evidence to adopt a more radical view. Consciousness, they argued, "overflows the organism" (Bergson) and is ultimately grounded in some sort of transpersonal "Mind at Large" (Aldous Huxley). Swanson (2018) declines to discuss this ontologically more extreme version of filter theory, but Kelly & Presti (2015) have specifically embraced it in the context of psychedelic experiences and mystical experiences more generally, pointing out among other things that it can potentially explain the large amount of historical and cross-cultural evidence linking such states with unusually strong outbreaks of paranormal or "psi" phenomena. The term "psi" refers here in theoretically neutral fashion to the various categories of paranormal effects—"extrasensory perception" or "ESP" on the input side (including telepathy, clairvoyance, precognition and retrocognition), and psychokinesis or "mind over matter" effects on the output side. The defining property in all cases is that information appears to flow between an organism and its environment despite the presence of barriers (such as physical shielding, or distance in space and/or time) that would be expected on conventional physical principles to prevent such flows from occurring. See also Cardeña, 2014, 2018, 2020; Cardeña & Winkelman, 2011; Cardeña et al., 2015, chapter 12; Kelly et al., 2007, pp. 522-523; Kelly & Locke, 2009; Marshall, 2011). The need for serious consideration of such an expanded picture of the human psyche becomes inescapable in connection with the final empirical phenomenon to be discussed.

Near-Death Experiences (NDEs) Occurring under Extreme Physiological Conditions

Decades of experimental and theoretical work in neuroscience and psychology have led to a very strong consensus among contemporary mainstream neuroscientists

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that all the varying states of human consciousness are associated somehow with correspondingly varying patterns of neuroelectric activity in the brain. Different groups have seized upon different possible "markers" of consciousness, such as gamma waves, late components of evoked potentials, desynchronization or "activation" of ongoing EEG, and the PCI (Koch et al., 2016), but all agree that consciousness can only occur in brains that are currently capable of generating oscillatory activity in the frequency range of say 8 to 70 Hz or more and flexibly coordinating that activity over large distances in neocortex. Different theorists hold somewhat differing views as to the precise role such activity might play in generating, shaping, integrating and sustaining consciousness, but all agree that its availability is a necessary condition for conscious experience of any sort to occur. IIT itself is representative of this broader consensus.

However, it is now well established that so-called near-death experiences (NDEs) sometimes occur under extreme physiological circumstances such as deep general anesthesia and/or cardiac arrest in which those supposedly necessary conditions for consciousness have been severely degraded or abolished altogether. A primary purpose of general anesthesia, after all, is to render surgical patients unconscious of their surgeries, and the PCI and various other measures confirm that this is what normally happens; adequately anesthetized persons enter physiologically distinctive states different from those that accompany normal waking consciousness, and have nothing to report following their recovery from anesthesia. In the more extreme case of cardiac arrest, blood flow to the brain drops almost instantaneously to zero, the EEG flat-lines within 10 to 20 seconds, and even neuronal action-potentials—the ultimate physical basis for the causal interactions among brain elements upon which IIT rests—are quickly suppressed. This guarantees that in cardiac arrest the cortex is not merely inactive but deactivated, with the result that Φ necessarily goes to zero. Nevertheless, something on the order of 10-20% of such patients report having had not only a conscious experience of some sort, but the most profound and potentially transformative experience of their entire lives (Greyson, 2021 a, b; Holden et al., 2009; Kelly et al., 2007, chapter 6; van Lommel et al., 2001).

For scientists determined to resist the theoretical implications of such observations, the first line of defense is typically an objection to the effect that even in the presence of a flat-lined EEG there might be some sort of residual neuroelectric activity going on, not visible in scalp EEG, that could explain the conscious experiences. That objection, however, completely misses the mark: The issue is not whether there is brain activity of any kind whatever, but whether there is brain activity of the specific form regarded by contemporary neuroscience as a necessary condition for conscious experience, and activity of that form is readily detectable in scalp EEG (parenthetically, existing attempts to explain NDEs in terms of "brain flashes"—supposed surges of neuroelectric activity at or near the point of death—are of little scientific value; see Greyson, 2012b, pp. 31-32).

The next line of defense is to propose that the reported experiences did not actually occur during the period of apparent unconsciousness, when the brain was severely impaired, but either before or after the impairment. This objection, however, seems to be ruled out in many cases by the presence of time anchors, aspects of the reported experiences that can be verified as having happened during the period of apparent unconsciousness, but that could not have been observed by the patient even if fully conscious in the normal way. These include, for example, things reported as being seen or heard despite deliberate pre-surgical blockage of the corresponding senses, or events occurring during that time period but in a physically remote location. Over a hundred such cases are reported in Holden et al. (2009, pp. 185-211), and many more in Rivas et al. (2016). Many are well documented, and they cannot be collectively dismissed as mere "anecdotes." It would be desirable, of course, to supplement these case collections with experimental evidence based for example on perception by patients of targets deliberately set out in cardiac surgery theaters. There have been a few preliminary attempts along these

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lines, mostly unsuccessful (see Parnia et al., 2014), but we need more creative solutions to the problems of getting targets displayed in places where clinicians do not want them, and getting patients to seek them out and remember them in the midst of a life-threatening crisis.

Time anchors typically involve psi-type occurrences, and determined skeptics will try to ignore these, regardless of the level of documentation involved, on grounds that they are insufficient on their own to guarantee the reality of psi. That objection is irresponsible, however. The reality of psi as a fact of nature has been independently established by the large amounts of relevant observational and experimental evidence that have gradually accumulated, starting even before the founding of the British Society for Psychical Research in 1882. What is unusual about these NDE cases concerns only the circumstances in which psi events are occurring.

One final escape route, available only to persons who accept the reality of psi, is to agree that the reported experiences are imaginative constructions dating from a time before or after the period of brain impairment, but to admit in addition the capacity of psi processes to explain the time anchors—that is, via precognition from a time before, or retrocognition from a time after, the impairment. Even this interpretation, however, is contradicted by the fact that the reported experiences always precede, and never follow, the reports themselves.

For additional pointers into the very large body of evidence for psi phenomena in general see for example Cardeña (2018), Radin (2006) and the annotated bibliography of Kelly et al. (2007). For extensive further discussion of the "real-time" vs. "reconstruction" models of NDEs see in particular Nahm & Weibel (2020), who emphasize that out-of-body experiences (OBEs), including perceptions of the percipient's own body from a different spatial location (autoscopy), occur commonly not only in NDEs but under other conditions as well, and typically occur unambiguously in real time. They also underscore the additional challenge posed to physicalist accounts of both NDEs and OBEs by the fact that highly similar experiences occur under such an extraordinary variety of physiological circumstances.

For fuller documentation and justification of my brief treatment here of this theoretically crucial subclass of NDEs, readers are encouraged to consult the much richer sources cited above. These cases come straight from the heartland of contemporary biomedical science, and more and better such cases are coming to light as advances in resuscitation medicine enhance our ability to retrieve dying persons from the borderlands of death. Their special significance lies in demonstrating that unusually intense conscious experience sometimes occurs in association with brain conditions that IIT along with every other existing neuroscientific theory of consciousness deems incapable of supporting it. But as I will next briefly explain, the ontologically more radical filtration theory of Myers, James and Bergson allows us to come to grips with these NDE cases and many other "rogue" empirical phenomena in a scientifically and philosophically respectable way.

Conclusion

William James (1900), with characteristic precision, put his finger on the essential logical point. The overall correlation generally observed between mental happenings and happenings in the brain—which everybody accepts—can be interpreted in more than one way. Physicalists see it as straightforwardly confirming their "production" model, according to which mind and consciousness are manufactured by neurophysiological processes occurring in brains, in something like the way a tea kettle generates steam, or the electric current flowing in a lamp generates light. But the true function of the brain might instead be permissive, like the trigger of a crossbow, or transmissive, like an optical lens

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or prism, or like keys of a pipe organ—or perhaps in more contemporary terms like the receivers in our radios and televisions. The observed correlations of mind and brain would then reflect the operation of some sort of mental reality (which in James's view could be anything from a finite mind or personality to some sort of World Soul) that normally is closely coupled to the brain functionally, but somehow distinct from the brain and potentially capable of operating on its own. Within this basic framework James himself spoke variously of the brain as straining, sifting, canalizing, limiting, and individualizing that larger mental reality existing behind the scenes, and portrayed the brain as exerting these various effects in a manner dependent on its own functional status. James argued further that this picture is in principle compatible with all the facts conventionally interpreted under the production model, and that however metaphorical and incomprehensible it might at first seem, it is in reality no more so than its materialist rival. It also has certain positive superiorities, in particular its potential to explain various additional facts then being unearthed by F. W. H. Myers and his colleagues in psychical research—and numerous related facts unearthed since that time, as indicated above (Kelly et al., 2007).

Among the empirical phenomena highlighted in the present paper, NDEs occurring under extreme physiological conditions including cardiac arrest are surely the most critical, theoretically. Significant advances in science are standardly understood to derive from confirmation of bold conjectures and falsification of cautious or timid ones (Chalmers,1994, pp. 54-55), and NDEs of this sort exert both types of effects at once in favor of the Myers/James picture. On the one hand, conventional physicalist models including IIT clearly predict that no experience whatsoever should be possible under these conditions, and this "cautious" prediction is falsified by the experiences that do occur. From the Myers/James filter perspective, meanwhile, the possibility of such experiences can certainly be anticipated, if not strictly "predicted" as if by some sort of deductive logic, and this "bold" conjecture is confirmed. Facts of this theoretically pivotal sort cannot go on being ignored by mainstream science; we cannot and will not arrive at a satisfactory theory of consciousness unless we begin with a synoptic empiricism that embraces all theoretically relevant facts.

The existing empirical challenges to the currently prevailing physicalism are profound and inescapable, and they justify thoroughgoing re-evaluation of that physicalist worldview itself. The Myers/James picture as described so far is basically a psychological theory, but it has definite consequences for our picture of reality more generally. It is essential to appreciate here, first, that physicalism as conventionally understood is not itself science but metaphysics—a philosophical position deriving from, and chained to, the classic Newtonian physics of the late 19th century. That seemingly secure foundation in physics has subsequently eroded, however, beginning with the rise of relativity and quantum theories, with the result that physicalism is no longer consistent with our deepest physical science. Indeed, "matter" itself as classically conceived does not exist, and space and time can no longer be conceptualized as providing a pre-existing container for events. Furthermore, we have no credible understanding of how consciousness could be manufactured by physical processes occurring in brains, and recent work in philosophy of mind has convinced many that we can never achieve one (Chalmers, 1996; Nagel, 2012).

The underlying basic question here is not whether we will have metaphysics—because we inevitably will, whether conscious of it or not—but whether we will have good metaphysics or bad. And the second key point to appreciate here is that scientifically and philosophically respectable alternatives to physicalism are already on offer. I believe the great pioneers of consciousness research including Myers, James and Bergson were on the right track with their ontologically more radical form of "filtration" theory, and that the arguments and data presented in this paper (along with the other sources cited) drive us beyond IIT and its physicalist competitors in the direction of just such a theory. Descrip-

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tions and evaluations of various conceptual frameworks or worldviews or metaphysical systems of this sort both ancient and modern that seem capable of accommodating phenomena resistant to physicalist explanation can be found in Eastman (2020), Goff (2017), Kastrup (2019), Kelly et al. (2007, 2015), Kelly & Marshall (2021), Marshall (2021), Moreira-Almeida & Santos, (2013), Seager (2020), Strawson (2006), and numerous other sources pointed to therein. Without going into detail here, the central tendency of these theoretical possibilities, as anticipated by James in The Varieties of Religious Experience and his own later philosophical work, is toward a form of pluralist idealism falling generally within the category of evolutionary panentheisms (Hartshorne & Reese, 2000; Kelly et al., 2015). These are all conceptual near-neighbors of IIT, ironically, in making consciousness more than a product of our individual brains and much more fundamental to the scheme of reality as a whole, but arrived at from radically different directions. Many are also demonstrably more consistent with modern physics than physicalism itself.

For an account of James's trajectory see Kelly et al. (2015, Chapter 14). My personal sympathies presently tend toward some form of priority monism (Schaffer, 2010), possibly relying in particular upon an emerging conception according to which both classical and quantum physics can be derived from more basic "informational" principles which themselves are grounded in an ontologically prior universal consciousness (D'Ariano & Faggin, 2021; Faggin, 2021). Note that this program, if successful, will in effect drain physics itself of its traditional "physical" content, and move it strongly in the direction of realist idealism. Another live alternative is the various forms of dual-aspect monism, which seek to capitalize upon the ability of conventional physics to explain many regularities of human experience while avoiding a possible "inverse hard problem" of deriving matter from consciousness (e.g., Marshall, 2021; Velmans, 2021).

Let me underscore in conclusion that my theoretically revisionist colleagues and I genuinely celebrate existing science, and are only attempting to expand it in ways that will permit it to accommodate a wider range of humanly important empirical phenomena. What we are advocating is not any form of supernaturalism but an expanded naturalism. For an especially well-informed and optimistic account of the positive implications of these emerging views for the science of consciousness, including numerous suggestions for further basic and applied research, see Presti (2021).

The bottom line? IIT is bold, yes, but it is not bold enough!

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Einige konzeptionelle und empirische Mängel der IIT

Edward F. Kelly

Zusammenfassung: Die Integrierte Informationstheorie des Bewusstseins (IIT) hat innerhalb und außerhalb der wissenschaftlichen Gemeinschaft viel Aufsehen erregt und scheint für viele als der führende Anwärter zu gelten, was eine zufriedenstellende Theorie auf der Grundlage der Systemneurowissenschaften betrifft. Es handelt sich um eine kühne Theorie, die plausible Erklärungen für verschiedene anerkannte neurowissenschaftliche Tatsachen liefert, überraschende Vorhersagen macht, die über die derzeitige wissenschaftliche Orthodoxie hinausgehen, aber potenziell überprüfbar sind, und zur Entwicklung einer scheinbar wirksamen Technik beigetragen hat, die geeignet scheint, das Vorhandensein von Bewusstsein in Organismen nachzuweisen, die nicht in der Lage sind, sich sprachlich auszudrücken wie etwa nichtmenschliche Tiere, Neugeborene und schwer hirngeschädigte Erwachsene. Trotz dieser Vorzüge scheint die IIT grundsätzliche Fehler aufzuweisen: In diesem Beitrag werden zunächst einige wichtige konzeptionelle und technische Fragen aufgegriffen, die bereits früher aufgeworfen wurden, aber noch ungelöst sind - insbesondere Fragen bezüglich des IIT-Konzepts von "Information" und seiner Behandlung des "harten Problems" -, und dann rücken mehrere empirische Phänomene ins Zentrum, die die IIT offenbar nicht zufriedenstellend behandeln kann. Dazu gehören: 1. Fälle von multipler Persönlichkeit oder dissoziativer Identitätsstörung, bei denen komplexe und sich überschneidende Bewusstseinszentren in einzelnen menschlichen Organismen gleichzeitig auftreten; 2. das Scheitern beim Versuch, anzugeben, wie sich die intensive Phänomenologie psychedelischer Zustände direkt in der begleitenden neuroelektrischen Aktivität widerspiegelt; und, was am kritischsten ist, 3. die tiefgreifenden Wirkungen und die die Persönlichkeit verändernden Nahtoderfahrungen (NTEs) unter extremen physiologischen Bedingungen wie beispielsweise Herzstillstand, bei denen der IIT zufolge keinerlei bewusste Erfahrung mehr möglich sein sollte. Diese empirischen Argumente zeigen, dass die IIT selbst unhaltbar ist, und sie gelten auch für ihre physikalistischen Konkurrenten. Es gibt jedoch Alternativen, die wissenschaftlich und philosophisch respektabel sind.

Eberhard Bauer

Algumas insuficiências conceituais e empíricas da TII

Edward F. Kelly

Resumo: A Teoria da Informação Integrada sobre a consciência (TII) tem gerado muita empolgação dentro e fora da comunidade científica, e parece a muitos a principal candidata a uma teoria satisfatória fundamentada em neurociência de sistemas. É uma teoria ousada, que fornece explicações plausíveis para vários fatos neurocientíficos reconhecidos, faz previsões surpreendentes que vão além da ortodoxia científica atual, mas que são potencialmente testáveis, e inspirou o desenvolvimento do que parece ser uma técnica eficaz para detectar a presença da consciência em organismos incapazes de relato verbal, tais como animais não-humanos, recém-nascidos e adultos com o cérebro gravemente prejudicado. Apesar destas virtudes, a TII parece fundamentalmente imperfeita: Este artigo revisita primeiro algumas questões conceituais e técnicas chave que foram levantadas anteriormente, mas que permanecem sem solução - em particular, questões relativas ao conceito de "informação" da TII e sua abordagem do "problema difícil" - e depois se concentra em vários fenômenos empíricos que a TII parece incapaz de lidar de maneira satisfatória. Estes incluem: 1. casos de personalidade múltipla ou transtorno dissociativo de identidade em que centros complexos e sobrepostos de consciência coocorram em organismos humanos únicos; 2. o fracasso da intensa fenomenologia dos estados psicodélicos em se refletir diretamente em atividade neuroelétrica associada; e, de forma mais crítica; 3. a ocorrência de profundas e pessoalmente transformadoras experiências de quase-morte (EQM) sob condições fisiológicas extremas, tais como parada cardíaca, nas quais a TII prevê que nenhuma experiência consciente deveria ser possível. Estes argumentos empíricos mostram que a TII é, em si mesma, insustentável, e se aplicam também a seus concorrentes fisicalistas. Estão disponíveis, no entanto, alternativas cientificas e filosóficas respeitáveis.

Antônio Lima

Algunas deficiencias conceptuales y empíricas de la IIT

Edward F. Kelly

Resumen: La Teoría de Información Integrada de consciencia (IIT) ha generado mucho entusiasmo dentro y fuera de la comunidad científica; a muchos les parece la principal aspirante a una teoría satisfactoria basada en la neurociencia de sistemas. Se trata de una teoría audaz, que proporciona explicaciones plausibles para varios hechos neurocientíficos reconocidos, hace predicciones sorprendentes que van más allá de la ortodoxia científica actual pero que son potencialmente comprobables, y ha inspirado el desarrollo de lo que parece ser una técnica eficaz para detectar la presencia de la consciencia en organismos incapaces de informar verbalmente, incluyendo a animales no humanos, neonatos y adultos con daños cerebrales graves. A pesar de estas virtudes, la IIT parece tener defectos fundamentales: Este artículo discute en primer lugar algunas cuestiones conceptuales y técnicas clave que se han planteado anteriormente pero que siguen sin resolverse

-en particular, cuestiones relativas al concepto de "información" de la IIT y su enfoque sobre el "problema difícil." A continuación, se centra en varios fenómenos empíricos que la IIT parece incapaz de resolver satisfactoriamente incluyendo: 1. casos de personalidad múltiple o de trastorno de identidad disociativo, en los que coexisten centros de consciencia complejos y superpuestos en un solo organismo humano; 2. el hecho de que la intensa fenomenología de los estados psicodélicos no se refleja directamente en la actividad neuroeléctrica que los acompaña; y, lo que es más importante; 3. la ocurrencia de experiencias cercanas a la muerte (NDE), profundas y personalmente transformadoras, en condiciones fisiológicas extremas tales como el paro cardíaco, en las que la IIT predice que no debería ser posible ninguna experiencia consciente. Estos argumentos empíricos muestran que la propia IIT es insostenible y se aplican también a sus teorías competidores fisicalistas. Sin embargo, existen alternativas científica y filosóficamente respetables.

Etzel Cardeña

The Importance of the Exceptional in Tackling Riddles of Consciousness and Unusual Episodes of Lucidity

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Abstract: The problem of how biochemical processes in the brain give rise to conscious experience is still unanswered. This paper aims at stimulating the debate surrounding this enigma by advocating the study of unusual and anomalous aspects of consciousness. For this purpose, the contents of this paper are organized in three parts. In the first part, I provide a brief overview on unsolved riddles of the mind. These include unusual episodes of lucidity that have been termed terminal lucidity and paradoxical lucidity. Because the use of these terms has sometimes been inappropriate in recent literature, I clarify the basic meanings of these two concepts in the second part. The third part contains suggestions for future research. Specifically, I argue that the field of studies into episodes of lucidity in dementias and the field of studies into end-of-life experiences, such as near-death visions, should engage in an active dialogue in order to build bridges between these disciplines. Such a dialogue will enable a better understanding of the whole spectrum, and thus, possible circumstances, causes and underpinnings of lucid episodes. In sum, this paper argues that the study of lucid episodes such as terminal lucidity, paradoxical lucidity, and related occurrences holds enormous significance for improving our understanding of brain functions and accompanying states of consciousness – from a practice-orientated perspective in the contexts of the dementias and dealing with end-of-life experiences, and from a theoretical perspective in the context of the scientific debate about the nature of consciousness.

Keywords: Consciousness, terminal lucidity, paradoxical lucidity, dementia, Alzheimer's disease, end-of-life experiences, near-death visions

Highlights

- This paper argues that studying anomalies in consciousness research can contribute significantly to advancing the debate on consciousness.
- Various unusual and anomalous phenomena are addressed in this paper
- The concepts of terminal lucidity and paradoxical lucidity need to be reconceived.
- This paper proposes building a bridge between the fields of studies into dementia diseases and end-of-life experiences.

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Journal of Anomalous Experience and Cognition
(JAEX) 2022, Vol. 2, No. 2, pp. 264-296

https://doi.org/10.31156/jex.235356/jaex.24028

In 1872, pioneering physiologist Emil du Bois-Reymond (1818–1896) proclaimed his famous verdict regarding the question of how the behaviour of inanimate atoms of carbon, hydrogen or oxygen in the brain can give rise to phenomenal conscious experience: "Ignorabimus!" [We will never know!]" (du Bois-Reymond, 1872, p. 33). Since that time, neuroscientists have achieved tremendous progress with regard to elucidating neuronal correlates of consciousness. But still, the question of how exactly consciousness is related to the arrangement of matter in the brain has remained unanswered. In fact, discussions revolving around this topic have gained renewed momentum during recent years even in mainstream settings, especially among philosophers (e.g., Brüntrup, 2018; Chalmers, 2020a). Most of these philosophical discussions are theory-centred and continue to address the general problem of how and why physical processes in the brain give rise to conscious experience, i.e., they address what philosopher David Chalmers termed "the hard problem of consciousness" (Chalmers, 1995, 2020b). However, there exist a number of puzzling but empirically documented facets of consciousness that hold the potential to enrich and further these theoretical speculations about the relation of the mind and the brain from a practice-orientated perspective. In the following sections of this paper, I aim at contributing to this debate by highlighting such puzzling facets of the human mind, putting a specific focus on unusual episodes of mental lucidity. The paper consists of three parts. First, I provide a brief overview on some of the mentioned riddles of the mind. Second, because a proper understanding of phenomena that are to be investigated is indispensable for moving a field forward without creating confusion, I clarify the basic meanings of two different concepts of lucid episodes that have been misrepresented in recent publications: terminal lucidity and paradoxical lucidity. I also present considerations as to how the general concept of "episodes of lucidity" should best be understood. In the third part, I present suggestions for future research. Specifically, I argue that the field of studies into episodes of lucidity in dementias and the field of studies into end-of-life experiences should engage in an active dialogue in order to build bridges between these disciplines. Such a dialogue will allow for a better understanding of the whole spectrum, and thus, possible causes and underpinnings of lucid episodes. In sum, I maintain that assessing unusual cases of apparent discrepancies between states of consciousness and correlated brain conditions is of vital importance for advancing our understanding of consciousness under normal conditions, and will contribute significantly to the debate on the hard problem of consciousness.

Overview of some Riddles of the Mind

One of the mentioned puzzles of consciousness consists in the well-documented effect that thoughts, feelings, beliefs, and volition can affect the biology of the brain and can literally change its neuronal and anatomical structure. Numerous empirical studies therefore support the view that self-induced mental activities, even sustained ordinary learning processes, do influence the brain's organization and plasticity (Beauregard, 2007, 2021). This finding seems difficult to reconcile with the standard notion in mainstream neuroscience according to which human consciousness is only a passive by-product of the brain's biochemistry and is principally unable to affect the brain. But mental states can furthermore affect the biology of bodily structures and functioning outside the brain, as exemplified by placebo and nocebo effects as well as somatic and physiological changes resulting from the influence of changing sub-personalities ("alters") in people with dissociative identity disorder (DID). Depending on which alter is "in control", somatic differences in one and the same body have been observed already in virtually every organ of the body (Coons, 1988). This may concern brain activity patterns (Schlumpf et al., 2014), skin characteristics, blood pressures, the presence or absence of allergies, diabetes symptoms, drug and intoxication sensitivities, or optical changes including colour vision and visual acuity (Kelly, 2007). In a recent case report, states of profound psychogenic blindness in one alter could switch within seconds to normal sight in another (Strasburger & Waldvogel, 2015). Similar phenomena that imply deliberate con-

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trol over usually autonomic processes can be induced via hypnotic suggestions or meditation training. Remarkable examples are constituted by purposefully induced changes in body temperature and heart rate, the hypnotic induction of skin burns, blisters, bleedings, allergies, or breast enlargements (Kelly, 2007, Nahm, 2012). It is presently unexplained how such somatic changes can be generated in response to a mental stimulus.

Other riddles of consciousness concern unusual discrepancies between cerebral structures or physiological processes and cognitive faculties accompanying such states. Examples of these discrepancies are constituted by people with gross malformation of the micro- and the macro-anatomy of brain tissues, such as in people with extreme hydrocephalus who nevertheless lead a normal life and may even score higher than the average in intelligence tests. Similarly, people who were born with only one brain hemisphere but who do not seem to differ from those living with two hemispheres regarding their motor and mental abilities pose challenges for the notion that the evolution of human intelligence was only possible because of the evolution of two large and complicatedly structured hemispheres. Even more perplexingly, the mental faculties including memory recall of people who had one of their hemispheres surgically removed is usually hardly impaired after this drastic operation, if at all. Curiously, it has already been observed that removing an entire damaged hemisphere results in considerably less mental impairment than removing only damaged parts of a hemisphere (for a review of these topics, see Nahm et al., 2017). Moreover, several savants possessed extraordinary memory capacities that need to be taken into account when developing theories of memory functioning, and therefore, also of consciousness. We know of savants who could remember and re-play complex piano pieces without mistake after having heard them only once, and savant Kim Peek (1951–2009) remembered the contents of more than 12,000 books – apparently verbatim. Usually, he would read one page in eight to ten seconds, and he even read two pages of smaller books such as paperbacks simultaneously, using one eye each for each page (Treffert, 2010). Given that the storage of long-term memories in the brain is thought to entail the synthesis of proteins (a process that takes at least several seconds), it is unclear from a neurophysiological perspective how assumed physical memory traces of most minute details of complex piano pieces or of entire books could be stored indelibly in the savants' long-term memory immediately upon perceiving their very swift and non-recurring flow through sensory channels – a question that has, to my knowledge, not yet been addressed in memory research. The outstanding abilities of Kim Peek are particularly remarkable as he possessed a severely malformed brain (Treffert & Christensen, 2005). Other discrepancies between brain states and cognitive functioning are reported from near-death experiences (NDEs). In these experiences, people undergoing life-threatening crises, for example after a cardiac arrest when the brain is severely deprived of oxygen, sometimes report having experienced profound episodes of mental lucidity and memory recall that are at odds with the severely compromised brain state (Rivas et al., 2016; van Lommel, 2021; see also Parnia et al., 2014). The sometimes-heard argument that these experiences must actually have taken place before or after the breakdown of cortical network activities is problematic for a number of reasons and called into question by empirical evidence (Nahm & Weibel, 2020).

In the remainder if this publication, however, I will focus on another unusual type of lucidity that occurs in near-death states and that has been referred to as "lightening up before death" (Macleod, 2009) and "terminal lucidity" (Nahm, 2009; Nahm & Greyson, 2009). In such cases, moribund people display an unexpected surge of mental clarity shortly before dying. The most peculiar cases occur in patients suffering from mental disability including mental illness and brain conditions that involve severe neurodegeneration, such as strokes, brain tumours, and neurodegenerative dementias like Alzheimer's disease. In drastic instances, people who have not recognized family members or caregivers for years, and have not spoken for that time, suddenly sit up in their bed, being

brightly aware, recognize their kin again, remember their life, speak coherently again – and die within the next seconds, minutes, or hours (Nahm, 2009, 2012, Nahm et al., 2012). Terminal lucidity can also go hand in hand with so-called near-death visions or deathbed visions – visions of spiritual figures or deceased loved ones that seem to prepare the moribund for their transition, or visions that appear like glimpses into a spiritual afterlife realm (Osis & Haraldsson, 1977, 2012; see below).

Judging on the available literature on these near-death phenomena, it seems that consciousness can remain intact, or can even be enhanced, under a variety of compromising brain conditions, and that furthermore, also unusual episodes of lucidity can occur under a variety of different brain conditions. In conjunction with the other riddles of the mind, these observations highlight the significance of lucid episodes, especially those occurring at the end of life, for elaborating an improved understanding of the nature of consciousness and its relation to neurophysiological brain states. In this respect, it is a promising development that the general and scientific interest in episodes of lucidity has grown substantially in recent years. In the scientific context, this is particularly evident in dementia research, and here especially in the USA. Following initial publications that highlighted new fields of research in dementia diseases (Eldadah et al., 2019; Mashour et al., 2019), six research projects with a funding volume of about two million dollars have lately been launched by the National Institute of Health (NIH, 2020). Furthermore, several recent publications have examined lucid episodes in dementias from different angles (Bostancikliоğlu, 2021; Gilmore-Bykovskyi et al., 2021; Morris & Bulman, 2020, 2021; Ney et al., 2021; Peterson et al., 2021). However, there seems to exist uncertainty regarding the precise understanding of the concept of terminal lucidity. Because the correct understanding of its meaning is indispensable for the proper advancement of research into lucid episodes and misrepresentative notions should not gain traction, I will now turn to elucidating the concept of terminal lucidity and some related terms.

Clarifying Concepts

What is Terminal Lucidity?

The mentioned uncertainty regarding the precise meaning of the concept of terminal lucidity originates in part from imprecise characterisations of this term in my own publications. In 2009, Bruce Greyson and I described it in general terms as "the unexpected return of mental clarity and memory shortly before death", emphasising that the most remarkable cases involve people who suffered from mental illness (Nahm & Greyson, 2009). In the same year, Erlendur Haraldsson and I described terminal lucidity similarly as the marked decrease of mental confusion shortly before death. We stressed that this increase in mental faculties is particularly remarkable in mentally ill or impaired people (Nahm & Haraldsson, 2009). Also in another paper, I referred to terminal lucidity broadly as "the sudden return of mental clarity shortly before death" (Nahm, 2009) and highlighted that the most peculiar cases involve people who suffered from mental impairments, including dementia diseases. In various other publications, I have also characterised terminal lucidity in this sense (e. g., Nahm, 2011, 2012, 2013, 2017). In two publications, however, my co-authors and I described terminal lucidity more narrowly, namely as the unexpected return of mental clarity and memory shortly before death in patients suffering from severe psychiatric and neurological disorders (Nahm & Greyson, 2014; Nahm et al., 2012). This exclusive focus on people with psychiatric and neurological disorders was inadvertent, however, and is in effect misleading. Terminal lucidity can also occur in drowsy or confused people who die with healthy brains. Moreover, unexpected mental clarity shortly before death can even occur in people born with mental disabilities (Nahm & Greyson, 2014). In such cases, it is inapt to speak of an unexpected "return" of mental clarity as the observed mental clarity might have never existed before. Because of these ambiguities in my publications and inappropriate treatments of the concept of terminal

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lucidity also by other authors (see below), I made it clear in a recent publication that terminal lucidity refers to "any kind of unusually enhanced mental clarity before death" (Nahm, 2022, p. 1).

The Distinction Between Terminal and Paradoxical Lucidity

In my extensive compilation of case reports of unusual episodes of lucidity (Nahm, 2012), I also referred to reports of remarkable episodes of lucidity in patients with advanced dementias that had occurred weeks or months before their death and therefor had apparently no relation to dying. In order to avoid fostering the probably unwarranted notion that all episodes of unusual lucidity, especially in advanced dementia diseases, are related to dying, a team of authors including myself introduced the concept and term of "paradoxical lucidity" into the literature (Mashour et al., 2019). In short, the difference between the two concepts of terminal and paradoxical lucidity is this (Nahm, 2022):

The term "paradoxical" is a qualitative and state-related attribute that, in principle, says nothing about the time at which a lucid episode occurs in the course of a neurodegenerative process. However, it implies the presence of a pathophysiological, neurodegenerative brain condition that does not seem to be consistent with the observed mental lucidity. This is why it is considered "paradoxical."

The term "terminal", on the other hand, is a time- and process-related attribute that, in principle, says nothing about the brain state of a dying person and the potential paradoxicalness of an episode of lucidity. It can occur in patients with or without brain conditions. However, the unexpected episode of lucidity always occurs relatively shortly before death.

Hence, both terms refer to different aspects of lucid episodes. Nevertheless, an overlap between the two concepts occurs quite naturally when, for example, patients suffering from severe neurological damage display an unusual episode of lucidity shortly before their death. In such cases, both terms fit and one could even speak of "paradoxical terminal lucidity." Mehmet Bostanciklioğlu (2021) has already used this formulation, but only casually and without explaining the rationale behind using these terms in this manner. In fact, he used the terms terminal lucidity and paradoxical lucidity largely interchangeably in his article, but seemed to regard terminal lucidity as a kind of umbrella term with paradoxical lucidity being a property of terminal lucidity. As explained above, however, this generalization is inapt because paradoxical lucidity does not necessarily occur close to death. Moreover, another team of authors reversely considered paradoxical lucidity as an umbrella term and claimed that all cases of terminal lucidity should be considered instances of paradoxical lucidity (Peterson et al., 2021). However, this notion is likewise inapt because terminal lucidity does not always involve severe neurodegenerative conditions that would render its occurrence paradoxical (Nahm, 2022).

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Terminal vs. Paradoxical Lucidity: Further Clarifications

Commenting on my clarification of the matters (Nahm, 2022), Peterson et al. (2022) nevertheless repeated their proposition that all cases of terminal lucidity must be regarded as instances of paradoxical lucidity. They argued there would be no evidence for terminal lucidity in people without psychiatric or neurological brain conditions – not even in my own publications. I address their claims below.

1) Unexpected surges of enhanced mental clarity in people shortly before dying have been reported for ages and across cultures (e. g., Lim et al., 2020; Nahm, 2012; Macleod, 2009; Schreiber & Bennett, 2014). To the best of my knowledge, nobody except Peterson and his team has ever claimed that these surges are only known from subjects suffering from brain conditions. In fact, already medical standard literature on unexpected mental clarity before death contains cases that did not involve brain conditions.

For example, some of the patients described by Lim et al. (2020) and Macleod (2009) obviously had no brain conditions; the latter publication contains in addition a reference to a particularly instructive case of a soldier who had lost a leg and succumbed to this injury. Moreover, even my own publications do contain several examples of people who displayed terminal lucidity but had no brain condition. One report concerns the mother of the formerly renowned German philosopher Hans Driesch (1867–1941; Krall et al., 2021), who died of peritonitis (Driesch, 1951). After uttering only unintelligible words during previous hours, she finally slipped into sleep and unconsciousness. She was expected to die soon. Yet, to the amazement of those present, she suddenly awoke again to bright awareness and spoke about what she experienced during the time of her unconsciousness. But this episode of lucidity lasted only briefly. She became unconscious again and died shortly afterwards (Nahm, 2009, 2012). Judging upon Peterson et al.'s (2021) first criteria for determining the potential paradoxicalness of a lucid episode, namely (1) the type of the neurological condition and (2) the irreversibility of the neurological condition, this woman's surge of mental clarity before death clearly does not qualify as paradoxical lucidity because a neurological condition did not even exist. Elsewhere, I described four other cases of terminal lucidity that seemingly did not involve brain conditions (Nahm, 2012).

2) In order to support their argument that there would be no evidence for terminal lucidity in people without brain conditions even in my own publications, Peterson et al. (2022) referred to the two already mentioned publications in which terminal lucidity was introduced as the unexpected return of mental clarity before death in patients suffering from psychiatric and neurologic disorders (Nahm & Greyson, 2014; Nahm et al., 2012). Simultaneously, they disregarded all other sources in which my co-authors and I defined terminal lucidity in general terms and in agreement with my clarification. Yet, selecting a specific minority of past formulations that convey an obsolete notion which I have already corrected appears inapt, especially as my clarification was explicitly written to prevent further inappropriate usage of the terms terminal and paradoxical lucidity: "Realizing that the matters have so far not been expressed with appropriate precision in previous publications, *including my own*, I explain below how these two terms were originally conceptualized and should be understood" (Nahm, 2022, p. 1; emphasis added). Authors concerned with my understanding of terminal lucidity should therefore refer to this clarification and to previous publications that match its content.

3) Peterson's co-author Jason Karlawish has recently, together with me and other authors, discussed surges of neurophysiological activity in the brains of rodents who died *without* neurological conditions as a possible mechanism for paradoxical lucidity in patients who die *with* neurological conditions. We argued that "some patients with severe dementia might also experience a surge of neurophysiological activity before death, which is manifested as a lucid episode" (Mashour et al., 2019, p. 3)[2]. But because such surges in rodents without neurological conditions would be even more likely to occur also in humans without neurological conditions, one wonders *a fortiori* on what grounds Karlawish and his co-authors deny the existence of evidence for terminal lucidity in people without neurological conditions (Peterson et al., 2022).

[2] Apart from rodents, unusual neurophysiological activity around the time of dying has also been reported from humans in several studies already (Auyong et al., 2010; Barbato, 2001; Barbato et al., 2017; Chawla et al., 2009, 2017; Gambrell, 2005; Masman et al., 2016; Norton et al., 2017; Vicente et al., 2022). It is still debated how these neurophysiological activities can be interpreted (Greyson et al., 2013, 2022; Norton et al., 2017). Nevertheless, it is reasonable to assume that instances of terminal and paradoxical lucidity will typically go hand in hand with changes in neuronal activity. Already Barbato (2001) had reported a case of a woman who awoke after a prolonged period of unconsciousness and spoke to her family. The measured brain activity increased considerably during this lucid episode. She died hours later. According to Barbato (2001, p. 106), such increases in neurophysiological activity could "validate the not infrequent observations that patients may open their eyes, stare, or take a deep sigh at the point of death."

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Nevertheless, I agree with Peterson et al. (2022) in that the characterization of terminal lucidity as occurring "before death" or "shortly before death" is not (yet) properly elaborated and open to subjective line-drawing. This precisely mirrors the situation regarding the term "paradoxical" and constitutes one reason why I used gradual shading to illustrate the onset of terminal and paradoxical lucidity episodes in Fig. 1 of my previous publication instead of using a line or an abrupt onset of colouration (Nahm, 2022). The current lack of widely approved elaborate definitions does not, however, question the overall validity of these two concepts. Rather, it is my hope that just as researchers are now attempting to define the term "paradoxical" more precisely in the context of research projects addressing lucid episodes in dementias, a refined definition of the term "terminal" will also be developed in future. Peterson et al. (2022) furthermore criticized

that a "causal story relating the dying process to the lucid moment" is lacking in my current definition of terminal lucidity. Again, I agree with them in that such a causal relation needs to be captured in refined future definitions – and in fact, my explicit characterization of terminal lucidity being "process-related" (Nahm, 2022) implied a causal relation already. Hence, in contrast to what Peterson et al. suggested, being killed accidentally after displaying an unexpected episode of lucidity, as the subject in a hypothetical example they presented, does not match my criteria for terminal lucidity. There is no appropriate process-relation between a fatal accident and an unrelated lucid episode that occurred before this accident.

To conclude this section, I would like to emphasize that a proper and consistent use of well-defined basic terms is very important to avoid misunderstandings or the development of ambiguous concepts in the nascent field of research into lucid episodes. This obviously includes also general terms such as "lucid episodes" and "episodes of lucidity". In a recent publication, for example, Patricia Morris and Donna Bulman (2020) explicitly

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equalled the term "lucid episodes" with "paradoxical lucidity" in their publication's Abstract. Throughout their paper's text, they continued to focus on lucidity in advanced neurodegenerative disorders – but they also admitted that the term "lucidity" is used in diverse ways and they even referred to one of my publications in which "terminal lucidity" was introduced in general terms, i.e. without implying paradoxicalness (Nahm, 2009). Hence, equalling lucid episodes explicitly with paradoxical lucidity without further explanation does not seem to be apt because paradoxical lucidity only refers to lucid episodes in patients who are assumed "to have permanently lost the capacity for coherent verbal or behavioral interaction due to a progressive and pathophysiologic dementing process" (Mashour et al., 2019, p. 1107). Using the terms "lucid episodes" and "episodes of lucidity" in a more general sense appears more apposite since "good days" and "bad days" with regard to mental clarity, or fluctuations of cognition and awareness, are known to occur also at earlier stages of numerous neurological and psychiatric conditions including dementia diseases and brain injuries (Ballard et al., 2001; Gardner, 1976; Lee et al., 2014). A suitable general definition for episodes of lucidity that does not automatically imply paradoxicalness and that can therefore be used in various contexts was provided by Normann et al. (1998, 2006):

> An "episode of lucidity is an episode when the resident unexpectedly speaks or acts in a way that surprises the care providers because the resident seems to be much more aware of her/his situation and to function much more adequately than usual" (Normann et al. 2006, p. 1415).

Characterizing paradoxical lucidity, that is episodes of lucidity in the context of advanced neurodegenerative disorders, would then require additional specifications, such as the "key attributes" suggested by Morris and Bulman (2020).

Suggestions for Future Research

After having (hopefully) created increased terminological lucidity, I will now add two suggestions for further research into lucid episodes.

A Plea for Bridging the Fields of Dementia Research and Near-Death Studies

My first suggestion consists in taking end-of-life experiences (ELEs) into account in future research on paradoxical (terminal) lucidity. At present, it is my impression that scientists specialized in dementia diseases are not very familiar with the large and continuously increasing body of research concerning ELEs. In addition to terminal lucidity, ELEs cover a considerable spectrum of unusual incidents reported from the last phase of life. They have been reported for centuries and are not uncommon. On the side of the moribund person, they include visions of deceased loved ones or religious figures who appear to prepare the dying for their transition (near-death visions or deathbed visions), vivid and usually comforting dreams of similar content, perceiving unusual luminous phenomena or hearing inexplicable music, and an unexpected appetite and desire to eat. On the side of the bystanders, they include the sharing of near-death visions (shared death experiences), perceiving unusual lights or music as well, noticing synchronistic events such as the stopping of clocks and malfunctioning of electronic devices, or in case of absence, the distinct sensation that the moribund person has just passed away (for a selection of academic sources on ELEs from only recent years, see e. g. Claxton-Oldfield et al., 2020; Claxton-Oldfield & Dunnett, 2018; Claxton-Oldfield & Richard, 2020; Depner et al., 2020; Grant et al., 2020, 2021; Klein et al., 2018; Levy et al., 2020; Lim et al., 2020; Renz et al., 2018; Shared Crossing Research Initiative [SCRI], 2021, 2022). Although some of these phenomena are likely to be dismissed as irrelevant or hallucinatory by some, building bridges between the field of research into paradoxical lucidity in dementias and the field of ELEs is essential for facilitating knowledge exchange. In its current state, the absence of such a bridge might hamper constructive collaborations and even cause setbacks of the research progress. For example, had Peterson and his research team (Peterson et al., 2021, 2022) been familiar with some of the basic literature on ELEs, they could have known that terminal lucidity does also occur naturally in people who die without brain conditions, and would presumably not have propagated their claim that all episodes of terminal lucidity must be regarded paradoxical. Moreover, in the descriptions of the six research projects on lucid episodes in dementias funded by the NIH (2020), as well as in respective publications that have since been published by dementia specialists (see above), ELEs apart from terminal lucidity have not been mentioned. Although this comparably narrow focus is comprehensible in this initial phase of research, it is likely that an optimal understanding of paradoxical terminal lucidity, and perhaps also of paradoxical lucidity as a whole, can best be obtained if researchers studying lucid episodes familiarize themselves with ELEs and take them into explicit account when trying to identify the concomitant circumstances, conditions, triggers, and underpinnings of paradoxical (terminal) lucidity.

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A Plea for Studying Unusual Cases

My second suggestion is closely related to the first and consists in a plea for searching and documenting particularly unusual episodes of lucidity. For example, professional studies in the field of dementia research that also address spiritual and anomalous aspects of lucid episodes could serve as an immensely valuable source for enhancing our knowledge about states of consciousness near the end of life. Take, for example, near-death visions, which have attracted increased academic interest in recent years (e.g., Claxton-Oldfield & Dunnett, 2018; Dam, 2016; Kellehear et al., 2011; Kerr et al., 2014; Morita et al., 2016; Muthumana et al., 2010; Nosek et al., 2015; dos Santos et al., 2017; SRCI, 2022). Such visions often go hand in hand with terminal and even paradoxical terminal lucidity (Nahm, 2012; Nahm et al., 2012). From the standard medical perspective, they are typically regarded as being driven by psychological needs or the physiology of the dying brain.

Nevertheless, many of the available reports are still remarkable, especially in case they concern patients with end-stage dementia, such as in the following account:

> Mr. Sykes, an elderly man in the final stage of Alzheimer's disease, lapsed into an almost vegetative state two months before his death. He did not know where he was nor did he recognize his wife or children. He could not talk coherently and gave no sign of understanding anything about his circumstances. One day, however, "he sat up in bed and spoke as clear as a bell, talking just like anyone would, but not addressing us. He was looking upward with bright eyes and carrying on a conversation with 'Hugh'. He spoke loud and clear to Hugh, sometimes laughing but usually just conversing as though the two were sitting in a coffee shop having a chat." Mr. Sykes died later that day. It turned out that Hugh was a brother of his who was considered alive and well, but who had in fact died from a heart attack right about the time that Mr. Sykes "miraculously came back to life." (Moody, 2010, p. 15f)

This is a truly extraordinary report, but near-death visions that go hand in hand with enhanced mental clarity in patients with severe neurodegeneration have been reported already a number of times and I see no reason to question their authenticity as a whole. From a neurophysiological perspective, the significance of these reports is twofold. 1) Episodes in which severely demented or nonresponsive patients suddenly become alert and recognize people who appear in visions, and even talk to them in a coherent manner, are just as puzzling and paradoxical as when they suddenly recognize people in the flesh and talk to them in a coherent manner. 2) Although systematic studies on this topic are desirable but still lacking, it is remarkable that prima facie, pronounced near-death visions in people with severe neurodegeneration do not seem to differ phenomenologically from near-death visions of people dying with healthy brains. These aspects of near-death visions should be taken into account in the development of research tools and scales to address the degree of mental alertness and coherence during episodes of lucidity. It would moreover seem unwarranted to downgrade the quality of lucid episodes in case patients talk about visions that only they can see, especially since witnesses and patients themselves have stressed that experiencing near-death visions differs from experiencing "ordinary" hallucinations (Brayne et al., 2007; Fenwick et al., 2008). The only large-scale study on near-death visions performed until today has likewise found that these visions do not meet usual criteria for hallucinations but seem to possess autonomous dynamics (Osis & Haraldsson, 1977, 2012).

Furthermore, explicit consideration of particularly remarkable cases of unexpected lucidity could provide empirical evidence for furthering the debate concerning the hard problem of consciousness sketched in the beginning. Extraordinary cases of unusual lucidity could help answer the question of how far the brain's physiology is factually producing phenomenal human consciousness. Take, for example, the case of 19-year-old Juan whose brain activities were examined twice in an fMRI scanner by neuropsychologist Adrian Owen (2017), a renowned expert in the field of developing methods for communication with nonresponsive patients in vegetative states. Here is my summary of it:

> In previous examinations, Juan scored 3 of 15 points on the Glasgow Coma Scale, what represents the absolute minimum for coma patients. Indeed, also the fMRI scans performed with Juan during the course of two days showed that the characteristic patterns of activity in brain regions signalling awareness in response to applied stimuli were almost completely absent, although his eyes were open. Consequently, his body was regarded entirely unconscious. Weeks later, however, Juan unexpectedly awoke from his deep coma. To the amazement of Owen, Juan had a full recall of his two visits to Owen's laboratory. He stated he had heard and seen everything, but was not able to move or communicate. Owen confirmed that Juan was able to describe everything that happened correctly and that he also remembered the physicians who had been involved in his examinations. Stressing that

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> Juan's brain activities had 2been monitored deep down into its depths and showed no sign of consciousness, Owen was unable to offer an explanation for how Juan could have perceived and memorized all this.

Owen's report ties in with reports from near-death experiencers who report having been conscious and who provided veridical descriptions of what happened to them even after cardiac arrests – i. e., under conditions when standard models of brain function deem conscious awareness and memory storage impossible because of the breakdown of the cortical networks thought to be responsible for enabling these functions (Parnia et al., 2014; Rivas et al., 2016; van Lommel, 2021). A possible relation between paradoxical lucidity and NDEs might also be signified by a report related by Kenneth Ring (2007) according to which a woman in the terminal stage of Alzheimer's disease did not recognize the people who cared for her any more but remembered her NDE to the last. Owen's report about Juan might also lend credibility to seemingly related but almost unbelievable accounts reported from dementia diseases. For example, Jörgen Bruhn (2009) reported a case that was conveyed to him by the head of a nursing home. Here is my summary of it:

> An elderly woman in the terminal stage of Alzheimer's disease had mostly lain in her bed staring towards the ceiling. She had not spoken for two years. One day, she suffered a cardiac arrest and was resuscitated. To the amazement of her caregivers and family members, however, she became fully conscious after the resuscitation for a few hours. She thanked everybody for all they did for her during the past years, claiming she had been consciously aware all the time, but had not been able to communicate. She died during the night from a second infarction.

A similar case was reported to me in person. Here, a severely demented woman who had not been able to recognize family members anymore was said to have suddenly regained a lucid state of mind for no apparent reason. She likewise claimed having been mentally present during the previous time. She explained that her consciousness had detached from her body, and floated above it in a position from where she could observe everything that was going on, but that she had been unable to establish a connection to her body. This woman continued to live in this mentally improved state until she died a few months later. Such cases point to the possibility that there is a lucid and alert mind behind the scenes of non-responsive bodies of patients with late-stage dementia and other neurophysiological brain damage (Nahm, 2012). Should the occurrence of such unusual episodes of lucidity in severely demented people be confirmed in future research, this might also influence discussions about ethical questions in patient care.

However, remarkable reports of paradoxical terminal lucidity are not limited to dementia diseases. Some time ago, we cited a report about a woman who was completely paralyzed after having suffered serious strokes, but who sat up in her bed, and, apparently perceiving a near-death vision, stretched out her arms, smiled, called the name of her deceased husband, laid back, and died (Nahm et al., 2012). Just lately, I was informed about a very similar case: Here, a man had supposedly become entirely paralyzed due to strokes. Even his facial expression was immobile. Yet, after he had stayed in this vegetative state for one month, he suddenly sat up in his bed, looked at his wife and two sons for a few seconds in turn with an alert expression, smiled, laid back, and died. In another recently published case, a non-responsive patient whose brain stem had been destroyed by cancer suddenly opened her eyes so widely that the white was showing completely around her irises, tracked something moving in the room, looked at her two sisters who stayed at her bed, and died (SCRI, 2022).

Should the existence of such paradoxical episodes of lucidity under brain conditions that would usually not allow for their occurrence be confirmed and carefully documented in future research, this might contribute valuable empirical data for advancing our un-

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derstanding of the nature of consciousness. As mentioned in the introduction, most philosophical discussions concerning the place of consciousness in nature and the hard problem of consciousness are rather theoretical and chiefly consider "normal" correlations between a healthy mind and a healthy brain. But some of the introduced anomalies, including the case of comatose Juan, question the assumption that the correlations between mind and brain are always strictly symmetrical. Rather, they indicate that consciousness cannot be reduced to a passive by-product of the brain's biochemistry, notwithstanding that mind and brain activities are closely correlated under normal circumstances.

Conclusion

In this paper, I highlighted seemingly anomalous empirical aspects of the mind-body problem, largely focusing on lucid episodes such as terminal lucidity, paradoxical lucidity, and related occurrences. I am convinced that studying the introduced phenomena with an open mind holds enormous significance for improving the understanding of brain functions and accompanying states of consciousness – both from a practice-orientated and a theoretical perspective. On the practical side, explicitly assessing seeming discrepancies between cerebral structures and mental faculties could provide new insights into the factors that enable memory retrieval, perhaps also in dementia diseases. Potential research questions include the following: How is it possible that some people with severely malformed brains, such as Kim Peek, possess a virtually perfect memory? How can people retain their memories after one of their hemispheres has been disconnected or removed from the rest of their brain, and suffer apparently less impairments than people who lost only a part of one hemisphere? Which neuronal circuits need to be active or intact to enable these feats, and how can their functioning be disturbed or restored? Analogue questions arise with regard to paradoxical (terminal) lucidity. Tackling such topics could lead to finding new ways of improving memory access in people with anatomical or neurophysiological brain damage.

Moreover, explicit consideration of the interrelatedness of certain episodes of lucidity and ELEs could advance the formulation of explanatory models for paradoxical (terminal) lucidity. Studying lucid episodes in an integrative approach with a broad scope that also covers unusual fringe phenomena will allow best for forming a comprehensive understanding of the conditions and circumstances that may trigger unusual lucid episodes and also ELEs such as near-death visions. The growing interest in conducting scientific studies on paradoxical lucidity provides excellent opportunities to directly assess spiritual and anomalous aspects of ELEs. As a potential research objective, one could address the phenomenology of near-death visions and compare the degree of mental lucidity involved in such episodes to that of terminal lucidity without near-death visions. Another virtually untouched area of research concerns the study of ELEs in people with mental disabilities, what might lead to intriguing findings (Nahm & Greyson, 2014). In addition, caregivers have already complained repeatedly about a lack of training concerning how to properly deal with ELEs. However, the interest in these topics is growing fast even in the professional medical setting. Evidently, researching terminal lucidity as well as other ELEs, plus raising the awareness about them, would result in a better preparation for witnessing and interpreting unusual occurrences during the last phase of life and the dying process. It will therefore greatly benefit the diseased and the dying as well as their kin and caregivers.

Furthermore, assessing cases like that of comatose Juan might throw new light on discussions about organ donation and the question of whether people in vegetative states who show no detectable sign of awareness might still be conscious and even sensitive to pain (cf. Dhanani, Hornby, et al., 2014; Dhanani, Young, et al., 2014; Rady & Verheijde, 2014).

On the theoretical side, empirical studies into anomalous phenomena of consciousness, such as those discussed in this paper, can enhance our understanding of consciousness in manners impossible for studies that merely focus on consciousness under largely normal conditions. This is particularly relevant for the ongoing discussion about the nature of consciousness including human consciousness – one of the most enigmatic questions of mankind. Philosopher Hans Driesch, whose mother's death I described earlier, was very aware of the significance of investigating specifically the unusual facets of consciousness and life. In a book on basic problems of psychology, he therefore demanded:

> One must look for exceptions, because exceptions are the best means for avoiding dogmatism. The abnormal is to be investigated; but naturally not because it is abnormal, but because it opens our view for understanding the essence of the normal. (Driesch, 1926, p. 261; author's translation)

Among his guiding principles for studying anomalous phenomena, Driesch considered building bridges to already established areas of knowledge of great importance to contextualize them and find possible explanations (Driesch, 1927; Nahm, 2021). The present paper follows this expedient scientific rationale and I hope it contributed to showing that studying anomalies is one of the most important, interesting, and rewarding undertakings scientists can pursue.

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Die Bedeutung des Außergewöhnlichen im Umgang mit Rätseln des Bewusstseins und ungewöhnlichen Episoden von Geistesklarheit

Michael Nahm

Zusammenfassung: Die Frage, wie biochemische Prozesse im Gehirn zu bewussten Erfahrungen führen, ist noch immer ungelöst. Dieser Beitrag soll die Debatte über dieses Rätsel anregen, indem er für die Untersuchung ungewöhnlicher und anomaler Aspekte des Bewusstseins eintritt. Zu diesem Zweck ist der Inhalt dieses Beitrags in drei Teile gegliedert. Im ersten Teil gebe ich einen kurzen Überblick über ungelöste Rätsel des Geistes. Dazu gehören ungewöhnliche Episoden von Luzidität, die als terminale Luzidität und paradoxe Luzidität bezeichnet werden. Da die Verwendung dieser Begriffe in der neueren Literatur manchmal zu wünschen übrig ließ, erkläre ich im zweiten Teil die grundlegende Bedeutung dieser beiden Konzepte. Der dritte Teil macht Vorschläge für die zukünftige Forschung. Insbesondere plädiere ich dafür, dass solche Studien, die luzide Episoden bei Demenzerkrankungen behandeln, mit solchen Studien über Erfahrungen am Lebensende, wie z. B. Nahtodvisionen, in einen aktiven Austausch treten sollten, um Brücken zwischen diesen Disziplinen zu schlagen. Ein solcher Austausch würde zu einem besseren Verständnis des gesamten Spektrums und damit auch der möglichen Umstände, Ursachen und Hintergründe von luziden Episoden beitragen. Zusammenfassend lässt sich sagen, dass die Erforschung luzider Episoden wie der terminalen Luzidität, der paradoxen Luzidität und verwandter Erscheinungen von enormer Bedeutung für ein besseres Verständnis der Gehirnfunktionen und der damit einhergehenden Bewusstseinszustände ist - sowohl aus einer praxisorientierten Perspektive im Zusammenhang mit Demenzerkrankungen und dem Umgang mit Erfahrungen am Lebensende als auch aus einer theoretischen Perspektive im Kontext der wissenschaftlichen Debatte über die Natur des Bewusstseins.

Eberhard Bauer

A Importância do Excepcional no Enfrentamento de Enigmas da Consciência e Episódios Inesperados de Lucidez

Michael Nahm

Resumo: O problema sobre como os processos bioquímicos no cérebro dão origem a experiência consciente ainda permanece sem resposta. Este artigo tem como objetivo estimular o debate em torno deste enigma ao defender o estudo de aspectos incomuns e anômalos da consciência. Com este objetivo, o conteúdo deste documento está organizado em três partes. Na primeira, apresento uma breve visão geral sobre enigmas não resolvidos acerca da mente. Estes incluem episódios inesperados de lucidez que foram chamados de lucidez terminal e lucidez paradoxal. Porque o uso destes termos tem sido, por vezes, inadequado na literatura recente, esclareço os significados básicos desses dois conceitos na segunda parte. A terceira parte contém sugestões para pesquisas futuras. Especificamente, sustento que o campo de estudos sobre episódios de lucidez em demências e o campo de estudos sobre experiências de final de vida, tais como visões no leito de morte, devem se engajar em um diálogo ativo, a fim de construir pontes entre as disciplinas. Tal diálogo permitirá uma melhor compreensão do conjunto e, portanto, possíveis circunstâncias, causas e fundamentos dos episódios de lucidez. Em suma, este artigo argumenta que o estudo de episódios lúcidos, como a lucidez terminal, lucidez paradoxal, e ocorrências correlatas têm enorme relevância para aprimorar nossa compreensão acerca das funções cerebrais e estados de consciência a elas associadas - a partir de uma perspectiva orientada para a prática nos contextos das doenças demenciais e para lidar com experiências de final de vida, a partir de uma perspectiva teórica no contexto.

Antônio Lima

La Importancia de lo Excepcional Para Abordar los Enigmas de la Consciencia y los Episodios Inusuales de Lucidez

Michael Nahm

Resumen: El problema de cómo los procesos bioquímicos del cerebro dan lugar a la experiencia consciente sigue sin respuesta. Este artículo pretende estimular el debate en torno a este enigma abogando por el estudio de los aspectos inusuales y anómalos de la consciencia. Para ello, el contenido del trabajo se organiza en tres partes. En la primera, ofrezco una breve visión general sobre los enigmas no resueltos de la mente. Estos incluyen episodios inusuales de lucidez que se han denominado lucidez terminal y lucidez paradójica. Dado que el uso de estos términos ha sido a veces inapropiado en la literatura reciente, aclaro los significados básicos de estos dos conceptos en la segunda parte. La tercera parte contiene sugerencias para futuras investigaciones. En concreto, sostengo que el campo de los estudios sobre los episodios de lucidez en las demencias y el campo de los estudios sobre las experiencias al final de la vida, así como las visiones cercanas a la muerte, deberían entablar un diálogo activo para tender puentes entre sí. Dicho diálogo permitirá una mejor comprensión de todo el espectro y, por tanto, de las posibles circunstancias, causas, y substratos de los episodios de lucidez. En resumen, este artículo sostiene que el estudio de los episodios lúcidos, como la lucidez terminal, la lucidez paradójica, y los sucesos relacionados, tiene una enorme importancia para aumentar nuestra comprensión de las funciones cerebrales y los estados de consciencia que las acompañan, desde una perspectiva orientada a la práctica en los contextos de demencias y el tratamiento de las experiencias al final de la vida, y desde una perspectiva teórica en el contexto del debate científico sobre la naturaleza de la consciencia.

Etzel Cardeña

2022, Vol. 2, No. 2, pp. 264-296

A Possible Case of Censorship of Submissions on the Nature of Consciousness[1,2]

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Raphael Fernandes Casseb — University of Campinas
Alexander Moreira-Almeida — Federal University of Juiz de Fora

Abstract: To advance the scientific understanding of consciousness, one should be open to theoretical pluralism to freely develop and rigorously test a wide diversity of paradigm candidates and communicate the ideas and findings to the scientific community. Science development is jeopardized when journals tend to present a field's state-of-the-art findings in a biased or misguided way or suppress investigations of a particular perspective. We describe the challenges and pitfalls we faced as guest editors during the editorial review process of a special issue of the journal *Frontiers* on "The Nature of Consciousness" and how we responded to it. We describe and discuss how the journal staff overruled our editorial role to enforce what was very likely academic censorship. We then offer a couple of recommendations to authors and editors that may face similar issues. We believe that following these recommendations will ultimately contribute to practical and theoretical advances in the understanding the nature of consciousness and the mind–brain relation.

Keywords: consciousness, mind–brain relationship, scientific journal, dogmatism, physicalism, dualism, scientific communication.

Highlights

- We report abuses of editorial power that occurred during the editorial review process of a research topic.
- We offer recommendations to authors that eventually face similar issues.

Understanding the mind–brain relation is one of the most challenging philosophical and scientific quests human beings have ever pursued. Using the terms coined by the philosopher of science Thomas Kuhn, we are clearly in a pre-paradigmatic phase when it comes to a consensus about the human consciousness: there is no widely agreed upon scientific paradigm on how to understand, deal with, and investigate the human mind and its relation to the brain (Chibeni & Moreira-Almeida, 2007; Kuhn, 1970). To advance the scientific understanding of this topic, we should be open to theoretical pluralism to freely develop and rigorously test a wide diversity of paradigm candidates (Moreira-Almeida & Araujo, 2017). As another philosopher of science, Imre Lakatos, proposed, we should allow and promote a Darwinian competition of research programs or paradigm candidates; the fittest (or the best one) should survive (Lakatos & Musgrave, 1970). In this sense, it is essential to combine methodological and rational rigor with open-mindedness for a fruitful and genuinely scientific quest.

Another centrally important way the scientific community ensures high-quality research is by publishing its findings in peer-reviewed scientific journals. In a nutshell, the peer review is a process by which scientists with expertise in the field critique each other's work before publication, ensuring that the new research is original and uses valid methods and analytical procedures. A peer-reviewed work is not necessarily correct or conclusive. It has its flaws, but scientific progress depends on the communication of information that can be trusted, and the peer-review process is a vital part of that system. However, science development is jeopardized when journals tend to present a field's state-of-the-art findings in a biased or misguided way (Moreira-Almeida et al., 2018) or suppress investigations with a particular perspective (Cardeña, 2015).

In this paper we briefly present the challenges and pitfalls that occurred during the editorial review process of the research topic "The Nature of Consciousness" for the journal *Frontiers*. We hope this report will help the academic community be aware of some of the obstacles posed by some journals to the integrity of the scientific process.

[1] This manuscript was sent to the *Frontiers*' Editorial Office before publication to give them an opportunity to respond. After two weeks, we received no answer or acknowledgment whatsoever.
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Journal of Anomalous Experience and Cognition
(JAEX) 2022, Vol. 2, No. 2, pp. 296-315

https://doi.org/10.31156/jaex.235356/jaex.24121

Journal of Anomalous Experience and Cognition (JAEX)

Brief Report

Planning the Research Topic

On July 29, 2020, the manager of the journal *Frontiers* sent an invitation to Marina Weiler to launch a research topic as a guest editor. After accepting the invitation, Weiler received on August 3, 2020, an email from *Frontiers*' journal specialist stating, "as a guest editor of a research topic, you would act as a [sic] handling editors for submitted manuscripts . . . . Each research topic is made up of a geographically diverse team of 3 or more guest editors of your choice to define the scope of your topic and share the editorial responsibilities." On August 31, 2020, Weiler had a conference call with a *Frontiers*' journal specialist, who later sent an email stating that they would "choose the most appropriate journal/sections once you have a theme in mind and we will discuss the best matching" (i.e., *Frontiers* would select the journal that best matched the proposed topic).

Weiler contacted other colleagues (Martin M. Monti, Raphael F. Casseb, and Alexander Moreira-Almeida) who agreed to work with her as co-guest editors of the new research topic devoted to the study of human consciousness. On September 28, 2020, along with an introduction to the final team of guest editors, Weiler sent an email expressing our concern about properly choosing a specialty chief editor who would suit the scope of our topic, fearing experiencing a similar issue with *Frontiers*' research topics as had occurred in the past (Cardeña, 2015).

On October 1, 2020, the journal specialist congratulated us for "putting together a very strong editorial team" while ignoring our concern about finding a proper specialty chief editor for our topic. However, she also informed us that the guest editors would be responsible for the following:

- Assessing whether or not a manuscript fits within the scope of the special issue and screening it with regard to whether or not it can be considered for inclusion and therefore sent on to reviewers.
- Sending the manuscript to reviewers through the *Frontiers*' system (a quick, streamlined, and straightforward process). Editors are asked to ensure that each screened manuscript is reviewed by at least two reviewers.
- Reviewing the reviewers' comments and making a decision on whether or not the manuscript is to be accepted for publication.

Three of the guest editors had a web meeting with Frontiers' staff to propose and discuss details of the proposed topic; we explained its aims and emphasized we would welcome theoretical and empirical papers dealing with different aspects of human consciousness. Importantly, we clarified we were interested in manuscripts that pursued different theoretical backgrounds, including physicalist and non-physicalist perspectives of consciousness, as indicated in the topic's description. We also expressed our concern about any possible bias from *Frontiers* toward approving submitted manuscripts, exemplified by the negative experience Cardeña had had in the past. In response, *Frontiers* assured us that the guest editors would have complete editorial freedom and submitted papers would be approved based on scientific rigor instead of philosophical backgrounds. After this meeting, we sent *Frontiers* the final version of our research topic proposal, "The Nature of Consciousness":

> Since ancient times, humanity has shown a deep interest in "consciousness" and its many facets. Consciousness can be defined in terms of sentience (response to external stimuli), wakefulness and responsiveness (levels of consciousness), or awareness (access conscious thoughts, the content of consciousness). Yet another approach is the ability to subjectively experience the world, generating a feeling of presence—that is, phenomenal consciousness or qualia. A fundamental question is how a physical system such as the brain relates to

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these first-person subjective feelings, known as the "hard problem of consciousness." Studies investigating neural correlates of processes related to level and content of consciousness, for instance, have grown prolifically in the last few years due to the advance in brain imaging techniques. Nevertheless, the mind–brain relationship is one of the most fundamental questions we still struggle to move forward with in this debate.

The research topic proposed here intends to address the nature of consciousness and is open to include studies from philosophy to medicine, due to the complicated nature of the problem. More specifically, we want to discuss whether the mind is an emergent property of the brain or whether they are somehow independent of each other. In this collection, we call for manuscripts covering the vast scope of theories and human experiences related to the mind–brain relationship. We will also accept original manuscripts addressing altered levels (such as anesthesia, coma, vegetative state, minimally conscious state, and sleep) and contents (such as meditation, trance, hypnosis, dissociative and anomalous experiences, perception, awareness, and consciousness-related psychiatric disorders) of consciousness that provide empirical evidence to this debate.

Even though eminent discussions have intensively touched upon this topic and helped its progression, there seems to be no consensus regarding significant points such as the nature of consciousness. Our goal is to help construct an organized body of theoretical and empirical studies to gather different perspectives—or even disagreeing opinions, in an unemotional fashion—and eventually contribute practical and theoretical advances to the field.

Keywords: consciousness, qualia, materialism, reductionism, dualism

On October 9, 2020, the guest editors received an email from a *Frontiers*' journal specialist, which read, "Everything looks good and promising." She also informed us that *Frontiers in Systems Neuroscience*, *Frontiers in Psychology*, and *Frontiers in Neuroscience* would host our proposal because they fit our research topic goals. A web page for the research topic was launched on November 16, 2020, and presented to the chief editor, who accepted it. Four days later, *Frontiers* officially launched the new research topic and made it available to the public.

Challenges

The first of the many negative experiences we had with this project started when Dr. Jim B. Tucker, whom we initially invited to contribute a manuscript, submitted an original research paper to our topic on August 15, 2021. The manuscript, "Memories of Previous Lives and the Nature of Consciousness," investigated cases of young children who reported alleged memories of a previous life, thus supporting the proposition that consciousness might not be wholly dependent on the neural processes of the brain but might exist separately from them.

Tucker's manuscript had been stuck in an "initial validation" process for 7 days when Weiler contacted *Frontiers* to ask to move the validation process forward and send the manuscript to the guest editors. Importantly, this was the first time any submitted manuscript had been in this initial validation process for so long. In comparison, all the previously received manuscripts had been cleared after 1 day (at that time, we had around 10 manuscripts submitted to our topic; thus, we had a general idea of the *Fron-*

tiers' timeline to approve submitted manuscripts). Without receiving any response, the guest editors sent new emails on September 7 and 23, 2021, requesting *Frontiers*' editorial staff to provide some information regarding the current situation of the referred manuscript. To make the process fair and efficient, we also stressed that we would like to move the review forward and send it to experts for a thorough evaluation. Once again, our emails went without a reply. On September 30, 2021, though, *Frontiers* notified Tucker that his manuscript could not be accepted for publication in *Frontiers in Systems Neuroscience* because the manuscript did not meet the scope of the specialty section to which it was submitted. However, this decision by the *Frontiers*' editorial office was unbeknown to all the guest editors.

On October 7, 2021, we contacted the journal manager of *Frontiers in Systems Neuroscience* by email to express our discontent with the delay of the process:

> There has been a mistake regarding the initial validation of the manuscript submitted by Dr. Jim Tucker (Manuscript ID: 759145). The submission was rejected (without consulting us), claiming it "does not meet the scope of the specialty section to which it was submitted."
>
> We, the topic editors who defined the scope, are sure that the manuscript does fit our special section. To underpin our statement, we kindly note that the research topic call for abstracts reads as follows:
>
> We want to discuss whether the mind is an emergent property of the brain or whether they are somehow independent of each other. In this collection, we call for manuscripts covering the vast scope of theories and human experiences related to the mind–brain relationship. Furthermore, we will also accept original manuscripts addressing altered levels (such as anesthesia, coma, vegetative state, minimally conscious state, and sleep) and contents (such as meditation, trance, hypnosis, dissociative and anomalous experiences, perception, awareness, and consciousness-related psychiatric disorders) of consciousness that provide empirical evidence to this debate (as defined in the original research topic call: https://www.frontiersin.org/research-topics/17734/the-nature-of-consciousness).
>
> The erroneously rejected manuscript presents a long and active line of research on "human experiences related to the mind–brain relationship" and aims "to discuss whether the mind is an emergent property of the brain or whether they are somehow independent of each other." The author of the manuscript addresses "experiences . . . that provide empirical evidence to this debate." [Abstracts for the three rejected papers are in the Appendix]

Hence, we kindly asked the *Frontiers*' editorial office to move the manuscript back to the editorial review process so we could continue the assessment of its scientific merit and decide on the acceptance or rejection of this work. The response came a week later, when a *Frontiers*' research integrity specialist provided a new reason for the rejection—namely, that it was not within the section's scope:

> While the manuscript may have been in scope for the research topic, all contributions to this research topic must be within the scope of the section and journal to which they are submitted, as defined in their mission statements. The specialty chief editor of Frontiers in Systems Neuroscience confirmed that this manuscript was out of scope for the section.

It should be noted that *Frontiers* performed the selection of the hosting journals for our topic according to the goals we described in the proposal. So we were surprised to

read that Tucker's manuscript did not fit the section's scope. Unhappy with this decision, Moreira-Almeida replied on October 18, 2021 (and did not receive a response):

> We insist to be respected as research topic-invited editors. It is not reasonable that we as editors do not have a chance to evaluate the quality of a manuscript that clearly fits the scope for the research topic (a scope that was approved by Frontiers).
>
> Someone (we don't know who), with no discussion with us (the editors), contacted the author, rejecting the paper, claiming it "does not meet the scope of the specialty section to which it was submitted."
>
> We have experience as invited editors for special topics in scientific journals . . . and as book editors . . . and we have never seen anything like that.
>
> Editors' decisions have always been respected. A respectful relationship that seeks rigorous scientific evaluation has always been the norm, as it is supposed to be in the academic world.
>
> Hence, we insist the editorial office moves the manuscript back to the editorial review process so we can continue the assessment of its scientific merit to decide on the acceptance or rejection of this work.

On October 19, 2021, a second submission, "Observer's Mind, Does It Exist?" from Drs. Petr Bob and Jose Acacio De Barros, did not pass the initial validation step either and ended up being rejected by the *Frontiers*' editorial office on the following day. Two weeks later, a third manuscript, "Brain–Mind Dualism and Entropy," also from Bob, met the same fate. Once again, *Frontiers* did not communicate these decisions to any of the guest editors, and on October 21, 2021, we sent another email to *Frontiers* complaining about this overstep of our editorial attribution:

> While we understand that this Initial Validation step is crucial for maintaining the quality of the manuscripts and ensuring they fall within the scope of the journal, rejecting submitted manuscripts at this step without the guest editor's consent is unprofessional, to say the least.
>
> I feel highly disrespected as an academic scientist to see that Frontiers rejects manuscripts submitted by authors who were invited to contribute to our topic.
>
> Every step of the editorial process is time- and energy-consuming, as you probably know. The guest editors spend hours per day looking for potential reviewers, evaluating their comments, and making sure the manuscripts are appropriate for publication, all for free and for the sake of open science.
>
> The corresponding authors from the rejected manuscripts have contacted us to understand what happened, and we were speechless. . . . I am not moving forward with any review process that I am currently editing unless *Frontiers* undoes the rejections and lets the guest editors do the job they were invited to do. Unfortunately, the entire topic and the other authors might be jeopardized because of Frontiers' abusive attitude.

A week later, we sent a follow-up email requesting a response that once again did not come. However, our labor-intensive editorial responsibilities that followed any submitted manuscript, such as finding appropriate reviewers, evaluating the reviewers' comments, and making decisions about publications, continued. Paradoxically, while *Frontiers* wanted to ensure that we were performing our editorial duties in a timely fashion, they were, at the same time, not allowing us to be editors—or at least not in an unencumbered way. Then, on November 5, 2021, after having our request ignored but continuously receiv-

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ing emails reminding us to take action on the other submitted manuscripts, we once again asked the journal to reverse the rejections:

> A few weeks ago, I let Frontiers know that I wouldn't be doing any more work as a guest editor for our Research Topic unless Frontiers stopped rejecting manuscripts without our approval. . . . As I mentioned before, such an attitude is unprofessional and abusive.
>
> As soon as the editor-in-chief makes the papers available again . . . I will be more than happy to resume my editorial role.

Another guest editor, disheartened with *Frontiers*' disregard for our requests, sent an email on November 10, 2021: "We would appreciate an answer to our message. We would be glad to resume our editorial role as soon as we are respectfully treated as editors."

Then, finally, on November 18, 2021, we received a vague explanation from the *Frontiers in Systems Neuroscience* journal manager regarding the rejections of two of the three rejected manuscripts:

> All manuscripts submitted to Frontiers go through the same rigorous quality checks, and we reserve the right to reject manuscripts at any point of the review process if they fail to meet these standards . . . the manuscript "Memories of Previous Lives and the Nature of Consciousness," this manuscript was deemed out of scope by the specialty chief editor of the journal . . . the manuscript "Observer's Mind, Does It Exist?" this manuscript was found to have a very significant degree of overlap with existing articles.

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Resignation

Thirteen months after our research topic was launched, we informed the journal manager of our resignation as guest editors. The three eventful months that followed the submission of the first rejected manuscript were filled with negative experiences that could jeopardize scientific advancements and academic freedom. In what follows, we discuss the three main reasons for our refusal to keep working with *Frontiers* during this research topic.

The first reason concerns the paradoxical and somehow unclear editorial role *Frontiers* expected from the guest editors. On the one hand, the labor-intensive and time-consuming duties related to any editorial role were requested almost daily. On the other hand, we had no freedom to decide which manuscripts merited peer review because three were rejected during the initial validation step without any guest editor's prior approval or disapproval. Importantly, we attempted to clarify the duties we would acquire as guest editors before launching the topic in a meeting with *Frontiers* representatives, whereby they guaranteed we would decide whether the manuscripts would be accepted for publication. However, that was not the case.

The second reason for stepping down from our editorial role was *Frontiers*' noncompliance with the agreed upon criteria for approving submitted manuscripts: scientific rigor and a match with the topic proposal. These criteria were not applied to any of the three rejected manuscripts. Our initial assessment was that they seemed scientifically sound and valid, fit the proposal scope, and should, thus, undergo the peer-review process. According to *Frontiers*' policies and publication ethics (https://www.frontiersin.org/about/policies-and-publication-ethics, 1.6. Retractions), they consider the following reasons as giving cause for concern and potential retraction:

- clear evidence that findings are unreliable, either as a result of misconduct (e.g., data

fabrication) or honest error (e.g., miscalculation or experimental error);

- findings have previously been published elsewhere without proper attribution, permission, or justification (i.e., cases of redundant publication);
- major plagiarism;
- the reporting of unethical research, the publication of an article that did not have the required ethics committee approval;
- legal issues pertaining to the content of the article, e.g., libelous content;
- major authorship issues, i.e., proven or strongly suspected cases of ghostwriting or sold ('gift') authorship;
- politically motivated articles where objectivity is a serious concern;
- the singling out of individuals or organizations for attack;
- faith issues (e.g., intelligent design);
- papers that have made extraordinary claims without concomitant scientific or statistical evidence (e.g., pseudoscience).

Although retraction of a published paper is somewhat different from a journal executive rejecting a paper supported by guest editors, the processes are similar, and the criteria for retractions can be used to examine the reasons for *Frontiers*' actions. *Frontiers* never discussed the scientific quality of the submissions nor provided us with any objective reason why the manuscripts were rejected. Such an unclear and obscure attitude was interpreted, from our end, as censorship because Tucker's paper suggested that consciousness might exist separately from the brain and Bob's papers contained words such as soul, nonphysical entity, and brain–mind dualism that may raise a red flag for physicalist scientists. We assume that *Frontiers* possibly rejected the manuscripts based on the last two items, criteria that clearly do not apply to any of the submissions. We, the guest editors, echo the words of Cardeña (2014), ironically published in a *Frontiers* journal, that "the scientific method should be applied in a non-dogmatic, open, critical but respectful way that requires a thorough consideration of all evidence as well as skepticism toward both the assumptions we already hold and those that challenge them" (p. 2).

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The third and last reason concerns the total disregard for our editorial requirements and discontentment. Our history with *Frontiers* is composed of frustrating attempts at communication, with no one providing us the name of the person in charge of the journals and the rejections. The scarce and vague responses that we received did not open any possibility for discussing a constructive and scientifically sound solution for the issues discussed above. Although it was easier for us, the guest editors, just to turn a blind eye to *Frontiers*' misconduct and move the research topic forward, we strongly felt that this was not the right thing to do. The scientific method is an invaluable procedure to humans' endeavor to understand nature and the human mind. Science is a process that progresses while acknowledging and working hard to fix its inevitable weaknesses and mistakes. Scientific journals have an essential role in this scientific process, ensuring the research is appropriately peer reviewed and communicated to the scientific community. Unfortunately, that was not the case for our topic.

Lessons and Recommendations

In light of all this background, we learned that, ideally, the scientific editorial process should: (i) maintain clear and respectful communication between authors, editors, and journal staff; (ii) remain open to submissions from a wide range of methodological and theoretical approaches; (iii) remain open to the investigation of the full range of human experiences; (iv) adopt scientific and philosophical rigor as the main criteria for analysis and rejection/acceptance of a manuscript in a non-dogmatic fashion.

We then offer a couple of recommendations to authors that eventually come to face similar issues than the ones reported here. Following these recommendations will ultimately contribute to practical and theoretical advances in the field.

• When abuses of editorial power occur, it may be an ethical duty to resign rather than participate in a compromised process.

• It is worthwhile exposing abuses of editorial power.

To conclude, it is our hope that our resignation echoes the voices of all authors and editors who believe in a respectful, communicative, and open-minded editorial process in scientific journals. It is all scientists' responsibility to ensure that the scientific process runs as straightforward as possible and does not get lost in the deep waters of authority and obscurity.

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Appendix

The abstracts of the three rejected submissions the initial validation step folow:

- "Memories of Previous Lives and the Nature of Consciousness." Jim Tucker, University of Virginia, Charlottesville. August 15, 2021: Manuscript submitted. September 30, 2021: Article rejected by *Frontiers in Systems Neuroscience* editorial office

Cases of young children who report memories of a previous life have been the focus of systematic study for the past 60 years. Over 2,000 cases of this worldwide phenomenon have been investigated. In the strongest cases, the children have provided details that proved strikingly accurate for an individual who lived in the past, sometimes at a great distance from the child's family. This review includes a set of case reports that demonstrate the phenomenon. The types of evidence that the cases produce of an anomalous connection between the child and the deceased individual are then considered. These include details the children provide that are verified to be accurate for the identified previous person; recognition tests in which the children are able to select people, places, or objects from the previous life out of a group of possible ones; behavioral and emotional features the children show, such as phobias related to the mode of death in the previous life; and birthmarks and birth defects in the children that are consistent with injuries, usually fatal injuries, that the previous individual suffered. The phenomenon is then considered in relation to the nature of consciousness. The cases suggest that following death, memories of events experienced by an individual can persist after the brain

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has ceased functioning and later become associated with another brain. This supports the proposition that consciousness is not wholly dependent on the neural processes of the brain but can exist separately from them. This leads to an exploration of the places of consciousness in relation to the physical world, and which of them may ultimately be primary.

- "Observer's Mind, Does It Exist?" Petr Bob, Charles University, Prague, Jose Acacio De Barros, San Francisco State University. October 19, 2021: Manuscript submitted October 20, 2021: Article rejected by *Frontiers in Neuroscience* editorial office

Rene Descartes described res extensa as a main characteristic of the external world structured from material bodies. On the one hand, he postulated that the human mind has a specific kind of "observing" existence that he called res cogitans, the soul. Recently, Francis Crick described some basic rules for the future science of consciousness, arguing that the traditional Cartesian concept of the soul must be replaced by a scientific understanding of how the brain produces the mind. On the other hand, some scientific research has suggested the opposite to be true, that the mind may influence the brain in measurable ways. According to scientific thought, the first world (res extensa) is composed of material bodies that also create the brain and its structures. The second world (res cogitans) is characterized by the "observer" as the basic existing nonphysical entity that, according to some interpretations of quantum mechanics, may "create" reality through the process of observation (or, technically, measurement).

- "Brain–Mind Dualism and Entropy." Petr Bob, Charles University, Prague. November 3, 2021: Manuscript submitted December 6, 2021: Article rejected by *Frontiers in Psychology* editorial office.

According to recent evidence, mental functions and consciousness are related to specific brain structures, but at the same time, there is evidence that mental functions and consciousness are related to binding of distributed and synchronized neural activities. Recent findings strongly suggest that the neural binding cannot simply be explained within the paradigm, suggesting localization of the mental functions needs a substantial revision of the philosophical scheme of the Cartesian concept of the brain and localization of consciousness and the so-called "brain–mind dualism." These findings indicate that binding and synchronization of distributed neural activities enable information integration, which is crucial for the mechanism of consciousness. There is increased evidence that disrupted binding and information integration produce disintegration of consciousness in various mental disorders. These disturbed interactions produce patterns of temporal disorganization with decreased functional connectivity that may underlie specific perceptual and cognitive states. Together, these findings suggest that the process of neural or cognitive unbinding influences more irregular neural states with higher complexity and negatively affects information integration in the brain that may cause disintegrated conscious experience, decreased mental level, or the loss of consciousness. In this context, recent findings suggest implications for future research focused on the mutual relationship between psychological states assessed by psychometric measures and brain physiological activities measured through complexity analysis based on mathematical and physical descriptions.

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Ein möglicher Fall von Zensur bei eingereichten Beiträgen über die Natur des Bewusstseins

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Zusammenfassung: Um das wissenschaftliche Verständnis des Bewusstseins voranzutreiben, sollte man offen für theoretischen Pluralismus sein, um möglichst viele Kandidaten für Paradigmen frei zu entwickeln und rigoros zu testen und die Ideen und Ergebnisse der wissenschaftlichen Gemeinschaft mitzuteilen. Der wissenschaftliche Fortschritt wird gefährdet, wenn Fachzeitschriften dazu neigen, die neuesten Erkenntnisse eines Fachgebiets auf voreingenommene oder fehlgeleitete Weise zu präsentieren oder Untersuchungen einer bestimmten Perspektive zu unterdrücken. Wir beschreiben die Herausforderungen und Fallstricke, mit denen wir als Gastherausgeber beim redaktionellen Reviewprozess eines Themenheftes der Zeitschrift *Frontiers* zum Thema "The Nature of Consciousness" konfrontiert waren und wie wir darauf reagiert haben. Wir beschreiben und diskutieren, wie sich die Mitarbeiter der Zeitschrift über unsere redaktionelle Rolle hinwegsetzten, um etwas durchzusetzen, was sehr wahrscheinlich auf eine akademische Zensur hinausläuft. Anschließend geben wir eine Reihe von Empfehlungen für Autoren und Herausgeber, die sich mit ähnlichen Problemen konfrontiert sehen könnten. Wir sind der Meinung , dass die Befolgung dieser Empfehlungen letztlich zu praktischen und theoretischen Fortschritten beim Verständnis der Natur des Bewusstseins und der Beziehung zwischen Geist und Gehirn beitragen wird.

Eberhard Bauer

Um Possível Caso de Censura a Contribuições sobre a Natureza da Consciência

Marina Weiler Raphael Fernandes Casseb Alexander Moreira-Almeida

Resumo: Para avançar a compreensão científica da consciência, deve-se estar aberto ao pluralismo teórico para desenvolver livremente e testar com rigor uma grande diversidade de candidatos a paradigmas e comunicar as ideias e as descobertas à comunidade científica. O desenvolvimento científico é prejudicado quando periódicos tendem a apresentar as descobertas mais recentes de um campo de forma tendenciosa, ou mal orientada, ou suprimir as investigações de uma abordagem particular. Descrevemos aqui os desafios e os obstáculos que enfrentamos como editores convidados, durante o processo de revisão de um número especial da revista *Frontiers* sobre "A Natureza da Consciência", e como respondemos a ela. Relatamos e discutimos como a equipe da revista contrariou nossa função editorial para impor uma provável censura acadêmica. Por fim, oferecemos algumas recomendações aos autores e editores que eventualmente enfrentem problemas semelhantes. Acreditamos que seguir tais recomendações poderá contribuir para avanços práticos e teóricos na compreensão da natureza da consciência e da relação mente-cérebro.

Antônio Lima

Un Posible Caso de Censura de Artículos Sobre la Naturaleza de la Consciencia

Marina Weiler Raphael Fernandes Casseb Alexander Moreira-Almeida

Resumen: Para aumentar la comprensión científica de la consciencia, se debe estar abierto al pluralismo teórico para desarrollar libremente y evaluar con rigor una amplia diversidad de candidatos a paradigma y comunicar las ideas y los hallazgos a la comunidad científica. El desarrollo de la ciencia corre peligro cuando las revistas tienden a presentar los hallazgos más avanzados de un campo de forma sesgada o errónea, o suprimen las investigaciones de una perspectiva concreta. Describimos los retos y escollos a los que nos enfrentamos como editores invitados durante el proceso de revisión editorial de un número especial de la revista *Frontiers* sobre "La Naturaleza de la Consciencia" y cómo respondimos a ello. Describimos y discutimos cómo el personal de la revista anuló nuestra función editorial para imponer lo que muy probablemente fue una censura académica. A continuación, ofrecemos un par de recomendaciones a los autores y editores que se enfrenten a problemas similares. Creemos que seguir estas recomendaciones contribuirá, en última instancia, a los avances prácticos y teóricos en la comprensión de la naturaleza de la consciencia y la relación mente-cerebro.

Etzel Cardeña

Are You "In the Zone" Or "Disconnected"? Flow, Dissociative Absorption, and Their Adaptive and Maladaptive Correlates[1,2]

Michal Zadik, Noa Bregman-Hai, and Nirit Soffer-Dudek

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Abstract: *Objective*: The terms dissociative absorption and flow describe tendencies to experience immersive consciousness states, yet dissociation is sometimes considered maladaptive whereas flow is typically considered to be adaptive. We explored their trait and state associations with psychopathology, game task performance, and mood, and examined the hypothesized moderation effect of self-efficacy. *Method*: In the present study, 303 undergraduates completed trait questionnaires and 63 high/low absorbers reported their state before and after an immersive task ("Tetris"). Task performance was also assessed. *Results*: We found that flow was distinguishable from dissociation but was inconsistent; two of its components ("transformation of time" (ToT) and "merging of action and awareness" (MoAA)) were positively associated with dissociation and psychopathology, and, unlike other flow components, were unrelated to enhanced task performance. Although the trait associations of ToT and MoAA with psychopathology were not dependent on self-efficacy levels, trait dissociation was more strongly related to psychopathology under low self-efficacy. In the state phase, state immersion (both ToT and dissociative absorption) was associated with mood improvement, especially under low self-efficacy. *Conclusion*: Our results prompt us to question the validity of flow as a cohesive construct, as measured by the Dispositional Flow Scale-2. Immersive experiences, including ToT and dissociative absorption, led to short-term mood improvement in the state phase but, considering their trait associations with psychopathology, engaging in them excessively may be maladaptive in the long term.

Keywords: dissociation, absorption, flow, self-efficacy, immersion, psychopathology, well-being.

Highlights

- Flow as a dispositional concept may lack a cohesive structure
- Momentary immersion in a game is associated with mood improvement
- A trait tendency for dissociative absorption is associated with psychopathology
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This study explores individual differences in the inclination to enter immersive consciousness states from two vantage points: dissociation and flow. These two separate fields of research have treated the tendency for immersion as either

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[2] This work was supported by the Israel Science Foundation under Grant No. 539/13 to NS-D, and (in part) by the Israel Science Foundation under Grant No. 1895/13 to NS-D.

https://doi.org/10.31156/jaex.23915

mostly maladaptive or adaptive, which raises a question regarding the adaptivity of immersion and the conditions under which it may exert negative or positive effects. We will describe the two constructs and then hypothesize about their relation.

Dissociation, a disruption in the normal integration of consciousness, including processes such as memory, emotion, and behavior (DSM-5; American Psychiatric Association, 2013), is related to various psychopathological symptoms (e.g., Boysan et al., 2009; Ford & Gómez, 2015; Soffer-Dudek, 2014). According to trauma theorists, it is a coping mechanism generated by traumatic stress, and over time, it may become maladaptive, emerging even when the individual is confronted with minor stressors and increasing the risk for psychopathology (e.g., Briere et al., 2005; Dalenberg et al., 2012). It has also been suggested that mild-to-moderate dissociation may result from mild-to-moderate distress, regardless of whether it was trauma-related (Buchnik-Daniely et al., 2021). Some argue that dissociative experiences lie on a continuum ranging from "non-pathological" to "pathological" dissociation (Dalenberg & Paulson, 2009; Kihlstrom, 2005). Both extremes are represented in the most widely used measure in dissociation research, the Dissociative Experiences Scale (DES; Carlson & Putnam, 1993), which comprises the domains of dissociative amnesia, depersonalization/ derealization, and dissociative "absorption and imaginative involvement" (henceforth, DA). Aligning with the widespread notion of common (or "non-pathological") dissociation (Butler, 2006; Dalenberg & Paulson, 2009; Waller et al., 1996), DA is described as a narrowing of the attentional spotlight resulting in full engagement with the attentional object and obliviousness to the surroundings (Soffer-Dudek et al., 2015; Waller et al., 1996). DA should not be confused with the general concept of absorption, which refers to an intense cognitive involvement in one or more aspects of conscious awareness (Tellegen & Atkinson, 1974). DA is similar but pertains only to narrowing rather than expansion of consciousness and is more strongly associated with other dissociative measures than with Tellegen's absorption (Bregman-Hai et al., 2020). Some structural dissociation theorists (Van der Hart et al., 2004), claim that DA is not dissociation, but see Soffer-Dudek & Somer (2023) for an account of the inherent dissociative elements of DA.

Although most dissociation theorists and researchers intuitively refer to DA as "non-pathological dissociation", there is little empirical evidence to demonstrate its adaptive functions. On the contrary, high DA is associated with various psychopathological symptoms such as obsessive-compulsive symptoms (Soffer-Dudek, 2017, 2019; Soffer-Dudek et al., 2015) and psychotic-like experiences (Humpston et al., 2016). In fact, DA and the DES Taxon—a subscale considered to reflect pathological dissociation that mostly excludes DA items—are significantly associated with each other (Allen et al., 2002) and with psychopathology (Levin & Spei, 2004). Moreover, intense immersive imaginative involvement in daydreaming may indicate a psychological syndrome termed "maladaptive daydreaming," in which the absorptive experience is addictive, resulting in dysfunction and distress (Somer et al., 2017). Due to DA's robust linear links with other dissociative subscales and with psychopathology, we have claimed that the label "non-pathological dissociation" should perhaps be abandoned in favor of a more neutral "common dissociation" (Soffer-Dudek, 2017; Soffer-Dudek et al., 2015).

A recent empirical study, however, suggested that despite its linear associations with trait psychopathology, DA may also carry some benefits or be adaptive, as suggested by some scholars (e.g., Butler, 2004; Cardeña, 1997). Specifically, among highly-functioning young adults, high absorbers were characterized by certain cognitive disadvantages, such as slower response times and increased commission errors, but compared to low absorbers, they had superior visual imagination abilities (Bregman-Hai et al.,

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2018). Butler (2006) theorized that adaptive absorptive processes may play a role in everyday activities, such as sports or listening to music and linked this kind of DA to the concept of "flow," a consciousness state that may occur during total immersion in activities, and in which there is a balance between one's skills and the activity's difficulty (Nakamura & Csikszentmihalyi, 2014). Such an experience is also referred to as an "autotelic experience," an enjoyable activity that is undertaken for its own sake, with no expectation of reward (Csikszentmihalyi et al., 2014). Flow is associated with a variety of positive factors, including psychological well-being (Sahoo, 2015), life satisfaction, self-esteem, decreased anxiety (Asakawa, 2010), and improved performance (Engeser & Rheinberg, 2008; Whitson & Consoli, 2009).

Among dancers, dissociation and flow were found to be separate processes (Thomson & Jaque, 2012), and in a later study on performing artists, only absorption and creative experiences, but not flow, were heightened among those with a history of multiple childhood adversities (Thomson & Jaque, 2018). Flow and DA have been conceptualized as "integrating" versus "separating", respectively (Thomson & Jaque, 2012). On the other hand, Carleton, Abrams, and Asmundson (2010) argued that absorption is a unifying or aggregative shift in awareness. Moreover, flow and DA seem to share similar attributes, and both were found to lead to greater task immersion (see Nakamura & Csikszentmihalyi, 2014 for flow, and Jennett et al., 2008 for DA). In fact, the components of flow – transformation of time (ToT) and merging of action and awareness (MoAA), which seem to imply dissociation, were indeed positively linked to dissociation among gamblers and athletes (Wanner et al., 2006).

In a recent study on performing artists, depersonalization was inversely associated with the flow components of sense of control, loss of self-consciousness, and autotelic experience, but positively associated with ToT (Importantly, the abstract of that paper states that the direction of the association with ToT was like the other scales, but that is not in accordance with the relevant data in the table within the paper. We verified with the authors that the mistake is in the abstract and not in the table). Moreover, performing artists with depersonalization disorder were significantly lower on the flow subscales of sense of control and autotelic experience (Thomson & Jaque, 2021). Therefore, we will refer to the flow components of ToT and MoAA as the "dissociative" components and to its other components as the "non-dissociative" components. Notably, the flow component label "loss of self-consciousness" seems to imply detachment from one's surroundings and thus may also purportedly suggest dissociative properties. Its items, however, assess disregard for evaluation from others, that is, the extent to which individuals do not worry about others' opinions of them, which is not essentially dissociative. Indeed, Wanner et al. (2006) found that high dissociators had higher, rather than lower, concern of evaluation. The treatment of dissociative and non-dissociative components by Thomson & Jaque (2012) as a single, cohesive scale may be the reason that they did not find a relation between flow and DA in dancers (Thomson & Jaque, 2012). The resemblance between dissociation and some aspects of flow raises the question of why the former is related to psychopathology and the latter to enhanced mental health? Butler (2004) suggested the pertinence of self-efficacy (SE) to distinguish flow from other dissociative experiences; however, to the best of our knowledge, this theoretical assertion has not been empirically explored.

SE refers to an individual's personal belief in their ability to achieve goals (Bandura, 1977), and it is positively associated with flow (Mesurado et al., 2016; Salanova et al., 2006). As for dissociative symptoms, SE is a protective factor in the context of post-traumatic stress disorder (PTSD), and it facilitates recovery from traumatic experiences (Benight et

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al., 2001; Benight & Harper, 2002), probably because of the sense of control over one's distress instilled by SE (Benight & Bandura, 2004). SE may therefore moderate the relation of immersion (flow or DA) with adaptive versus maladaptive correlates.

Some researchers have suggested that flow and immersion should be better differentiated (Michailidis et al., 2018). The present study examined the similarities and distinctions between the two immersive tendencies, DA and flow, their relation to psychopathology and objective functioning, and the possible moderating role of SE. We evaluated both dispositional and situational flow and DA, by conducting two different study phases: trait (correlational) and state (induced immersion). The induced immersive state was created by using the "Tetris" computer game, a validated method to experimentally induce flow (Keller & Bless, 2008).

The study hypotheses were: (a) Trait DA will be associated with the "dissociative" flow components (ToT and MoAA), and an exploratory factor analysis may yield a combined factor; (b) Dissociation will be positively related to trait psychopathology, whereas non-dissociative flow components will show inverse relations; (c) In the state phase, non-dissociative flow components will be positively related to performance in the immersive task and to positive mood change following the task; (d) In both phases, SE will moderate the relations between immersion (DA and the dissociative flow components), on the one hand, and psychopathological symptoms, task performance, and change in mood, on the other.

Materials and Methods

Participants and Procedure

For Phase 1 of the study, 314 undergraduate students enrolled in the study "Dissociation, attention, risk, and resilience," completing questionnaires that contained items for trait flow, dissociation, and SE. We (the first two authors, under the supervision of the third author) presented the study to participants online through the university's experiment system by stating that they were asked to complete a series of self-report questionnaires taking about 50 minutes. At the recruitment stage we explained that the study explored the links between dissociation, personality, and various attention and emotional states, that there were no right or wrong answers, and that participation in the study would contribute to the knowledge about dissociation and altered consciousness states. Additional measures administered are beyond the scope of the present investigation and are described elsewhere (Soffer-Dudek, 2019). The order of the questionnaires was counterbalanced. Eleven participants were excluded from the final sample because of either substantial missing data (7 participants) or very short completion time (less than 15 minutes in total for all questionnaires; 4 participants). Thus, the final sample comprised 303 participants (225 women, 78 men; aged 18–28, M = 23.53, SD = 1.39). Of the full sample, 215 participated in exchange for course credit and 88 for monetary reimbursement of 50 NIS (~$14). Independent samples t-tests indicated no significant differences between them on any of the study variables. We determined our sample size according to the guideline suggesting that N = 300 is a good sample size for factor analysis (Comrey & Lee, 1992).

For Phase 2 of the study, about 5-6 months on average after Phase 1, 155 participants with the highest and lowest scores on DA were offered to participate in a follow-up study, in exchange for a small sum (the equivalent of about $16). Sixty-four of them con-

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sented, whereupon they underwent a session of computerized tasks, and were administered state questionnaires before and after the tasks (T1 and T2). The first two authors presented the study as an experiment that would last an hour and a half and that would involve the completion of a few tasks and questionnaires. Again, we explained that the purpose of the study was to learn more about dissociation and altered consciousness states. One participant was excluded from the final sample due to a technical malfunction during the experiment. Thus, the final sample comprised 63 participants (52 women, 11 men; aged 20–27, *M* = 23.52, SD = 1.35). Of the full *N* = 63 sample, 33 participants were high in DA (*M* = 52.09, *SD* = 13.61, range 31.11-77.78), and 30 were low (*M* = 4.52, *SD* = 2.84, range 0-8.89). Our sample size of 63 participants is similar to the sizes used in previous studies in the field of task functioning in non-clinical dissociators (Chiu et al., 2009; Giesbrecht et al., 2007). Also, we relied on the work of Weibel & Wissmath (2011), who investigated the relation between flow and performance in various computer games, to calculate power. In the context of a non-realistic game with minimalistic design, the correlation between flow and performance in that study was *r* = .35. The sample size needed for this effect size according to G*Power software (Faul et al., 2009) is 61. We therefore deemed our sample of 63 participants suitable. We also referred to this sample and the participants' functioning on the task that we describe below in a different publication that explored sense of agency, automaticity, and meta-cognition for recall of task details (Bregman-Hai et al., 2020). The information presented in that paper differs markedly from that in the current paper, that study does not include flow, SE, or mood change.

Participants played "Tetris," a computer game (Meta-T; Lindstedt & Gray, 2015) that involves manipulating and rotating geometric objects that descend from the top of the screen with the objective of quickly stacking (fitting) these objects together to create complete rows of shapes, which then disappear, earning the player points (uncompleted rows fill the playing field, i.e., screen; the player must stack the shapes fast enough to complete rows before the shapes fill the screen in uncompleted rows). To induce a state of immersion (DA/ flow), the falling speed of the objects was individually adapted to engender concordance between the participant's skills and the task demands. Participants played for 10 minutes and were asked to start a new game if they were disqualified before the time elapsed (i.e., the player could not stack shapes fast enough to prevent the uncompleted rows from filling the screen entirely, leaving no room to stack new shapes, meaning that the game was over). Task performance was assessed based on the maximum number of lines that participants managed to clear in one game. The Ben-Gurion University of the Negev institutional ethics review board approved both study phases, carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki). Participants signed informed consent at the beginning of the studies and were debriefed with more detailed explanations of the purpose of the study following their participation.

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Measures

Dissociative Experiences

In Phase 1, dissociation was assessed using the revised Dissociative Experience Scale (DES-II; Carlson & Putnam, 1993), in which respondents estimate the percentage of time during the day that they experience any of 28 dissociative phenomena on an 11-point scale (0%, 10%, 20%, etc.). Cronbach's alphas in the present study were .89 for DA, .87 for dissociative amnesia, and .85 for depersonalization/derealization, and for the total score, it was .94. The Hebrew version of the DES has good psychometric properties (Somer et al., 2001). In Phase 2, we administered a state DA scale, adapted to this study from trait DA (items 2, 15, 17, 18, 20, 21, 22, 23, and 24 from the DES). It assessed the extent of partici-

pant absorption in the Tetris game (e.g., "I was not sure whether I had done the task or just dreamed about it") on an 11-point scale (0%-100%). Cronbach's alpha for these nine items was .63. We decided to omit the first item, which was based on item # 2 of the DES, "I did not hear background noise or talk around me,"}, since the game had background music. Cronbach's alpha for the final 8-item scale was .65. The correlation between trait and state DA was r = .53, p<.001.

Flow

In Phase 1, flow was assessed using the Dispositional Flow Scale-2 (DFS-2; Jackson & Eklund, 2002), a 36-item self-report inventory with a scale from 1 (never) to 5 (always). Nine dimensions of flow are assessed: challenge-skills balance, clear goals, unambiguous feedback, total concentration on the task at hand, sense of control, loss of self-consciousness, MoAA, ToT, and autotelic experience. Cronbach's alphas in this study were .75, .82, .89, .88, .80, .93, .69, .85, and .86, respectively, and .92 for the total DFS score. In Phase 2, flow was assessed using the Flow State Scale (FSS; Jackson & Marsh, 1996), a 36-item scale assessing the same nine dimensions, but in the context of a specific activity. Unfortunately, the last item of the FSS, namely, "I found the experience extremely rewarding," was accidentally omitted from the computerized questionnaire. Thus, the "autotelic experience" subscale in this study was based on just 3 items instead of 4. Cronbach's alphas were .68, .74, .84, .87, .90, .82, .84, .84, and .90 for the subscales, respectively, and .87 for the total FSS score. Proficient English speakers translated and back-translated both flow questionnaires to obtain validated Hebrew versions for this study. The correlation between the DFS and the FSS was r = .31, p = .015.

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Self-Efficacy (SE)

In Phase 1, we assessed SE using the 9-item perceived SE subscale of the Self-Control Schedule (SCS; Rosenbaum, 1980), originally a 36-item self-report measure, designed to assess learned resourcefulness, on a scale ranging from -3 (very uncharacteristic of me) to 3 (very characteristic of me). Cronbach's alpha for the SE subscale in the present study was .66. For Phase 2, we created a state SE scale, initially based on 8 items from the SE subscale of the SCS, but adapted in content to assess SE during the task (e.g., "I could change my actions according to my will"). Respondents indicated the degree to which each statement characterized their experience during the Tetris task on a scale ranging from -3 (not at all) to 3 (very much). Cronbach's alpha for all 8 items was a low .56, so we decided to omit three weakly-correlated items, resulting in a Cronbach's alpha of .73 for a 5-item scale. The correlation between trait and state SE was r = .42, p = .001.

Psychopathological Symptoms and Mood

We evaluated psychopathological tendencies in Phase 1 using the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983), a 53-item self-report measure that assesses nine types of psychological symptoms – somatization, obsessive–compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism – on a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely). The BSI is reliable in the Israeli population (Gilbar & Ben-Zur, 2002). Cronbach's alphas in this study were .80, .80, .80, .86, .81, .80, .67, .77, and .78 for the subscales, respectively, and .96 for the total BSI score. Mood was assessed in Phase 2, before (T1) and after (T2) the Tetris task, by using a state version of the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) that is used to assess positive (10 items) and negative (10 items) affect in the current moment on a scale ranging from 1 (very slightly or not

at all) to 5 (extremely). For each of the subscales (positive and negative), we subtracted the score of T1 from that of T2 to create a variable that represents the changes in positive and negative moods. A higher score on the positive emotion change score indicated improvement in mood, whereas a higher score on the negative emotion change score indicated a deterioration in mood. The two difference scores were not significantly correlated (r = -.05, p = .72), suggesting that they should be treated as two separate outcome variables.

Data Analyses

In both phases of the study, the amounts of missing data were negligible, so we did not employ a data completion strategy. In Phase 1, to assess the differentiation of dissociation and flow, we conducted an exploratory factor analysis (EFA) conjointly on DES and DFS items. Because of the exploratory nature of this inquiry, we did not specify the number of factors in advance and instead relied only on the default specification of Eigenvalues larger than 1, using SPSS software, version 23. Although this method may result in over-factoring, we did not pursue this investigation to retain a small number of factors, but rather to test whether any combined DES-DFS factors would emerge, as per our first hypothesis (In the supplementary material file, however, we also report the scree plot, which enables Catell's scree test to be examined for a more conservative criterion). The factor scores that emerged following the "Eigenvalue > 1" criterion were saved and used in partial correlations to assess their inter-correlations and associations with psychopathological symptoms and SE while controlling for sex, because of the preponderance of women in the study. They were also used in linear regression analyses, in which we examined whether SE moderates the relations between each of the immersion factors (DA and dissociative flow factors), on the one hand, and psychopathological symptoms, on the other, again controlling for sex.

In Phase 2, we used independent-samples t-tests to assess whether high- versus low-trait DA groups would have significantly different scores on state DA, state flow, and state SE. Next, we examined the partial correlations between state immersion (DA and dissociative flow scales) on the one hand, and state SE, task performance and mood change, on the other, controlling for sex and trait DA group. Finally, we employed regression analyses in which we relied on state immersion to predict performance on, and mood change after, playing a game of Tetris. We examined whether state SE moderated these relations, controlling for sex.

Notably, as Phase 2 analyses were based on two groups that were collapsed into one group and a relatively small sample, we did not expect the immersion variables to distribute normally. We therefore used bootstrapping (based on 1000 re-samples and bias corrected and accelerated confidence intervals). Further details regarding the data analyses are presented in detail in the supplementary material.

Results

Phase 1 (means and standard deviations of study variables are included in the supplementary material).

Exploratory Factor Analysis (EFA) and Correlations Between Resultant Factors

The Kaiser-Meyer-Olkin (KMO) Test of Sampling Adequacy was high (KMO = .89) and the Bartlett test of sphericity was significant (χ^2 = 12,044, df = 2,016, p<.001), indicating the suitability of these data for factor analytic procedures. In an EFA of DES and DFS items,

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thirteen factors emerged, all with loadings above .25, suggesting a relatively clear pattern of results from an empirical perspective. However, the thirteenth factor consisted of only a single item (DFS item 3; "I clearly know what I want to do"), and therefore it was not included in later analyses. Of the 12 remaining factors, none included items from both questionnaires; instead, each was based either on the items of the DES or the DFS alone, attesting to a coherent result pattern for the EFA from a theoretical perspective and supporting the separateness of the scales. The four DES factors were Depersonalization/Derealization, Dissociative Amnesia, Absorption and Obliviousness (DA-OBLIV), and Dissociative Identity Tendency (DA-DID). The latter two contain items that traditionally belong to the DA subscale of the DES, and thus, we will focus on them in our analyses as representative of a tendency for immersion. The eight DFS factors were Challenging and Rewarding Experience, Loss of Self-Consciousness, ToT, Enhanced Concentration, Unambiguous Feedback, MoAA, Sense of Control, and Clear Goals. All factors and the complete results of the EFA, including a scree-plot and zero-order correlations between the factors, which were saved as variables using the regression method, can be found in the supplementary material. Catell's scree plot results were indecisive but tended to show that the first five factors explained most of the variance. Included among these factors were DES DA-OBLIV and four DFS factors, while the more "pathological" factors of the DES seemed to explain less variance in this non-clinical sample.

Table 1 presents, controlling for sex, the partial correlations between the factors that emerged in the EFA. In every analysis in which we calculated correlations (in this table and later in the manuscript), we interpreted the findings according to the guidelines suggested by Gignac & Szodorai (2016) for individual differences studies, which suggest more liberal criteria than those originally proposed by Cohen, according to which coefficient sizes of .10, .20, and .30 correspond to weak, medium, and strong associations,

Table 1

Partial Correlations (Controlling for Sex) Between EFA Factors

	1	2	3	4	5	6	7	8	9	10	11
2	.02 [-.10, .14]										
3	-.16** [-.27, -.04]	.19*** [.08, .30]									
4	.28*** [.17, .38]	.30*** [.19, .40]	.07 [-.05, .19]								
5	-.29*** [-.39,-.18]	.29*** [.18, .39]	.31*** [.20, .41]	-.13* [-.24, -.01]							
6	.43*** [.33, .52]	-.09 [-.20, .03]	-.07 [-.19, .05]	.21*** [.10, .32]	-.19*** [-.30, -.08]						
7	.58*** [.50, .65]	-.07 [-.19, .05]	-.07 [-.19, .05]	.24*** [.13, .35]	-.24*** [-.35, -.13]	.49*** [.40, .57]					

8	.00 [-.12, .12]	.40*** [.30, .49]	.15** [.03, .26]	-.06 [-.18, .06]	.41*** [.31, .50]	-.12* [-.23, .00]	-.08 [-.20, .04]				
9	.10 [-.02, .21]	.27*** [.16, .38]	.27*** [.16, .38]	.26*** [.15, .37]	.15** [.03, .26]	.16** [.04, .27]	.15* [.03, .26]	.15** [.03, .26]			
10	-.11 [-.21, .02]	.33*** [.22, .43]	.22*** [.11, .33]	-.05 [-.17, .07]	.39*** [.29, .48]	-.17** [-.28, -.06]	-.06 [-.18, .06]	.38*** [.28, .48]	.16** [.04, .27]		
11	.06 [-.06, .18]	.39*** [.29, .48]	.10 [-.02, .21]	-.05 [-.17, .07]	.41*** [.31, .50]	-.08 [-.20, .04]	-.01 [-.13, .11]	.56*** [.48, .64]	.15** [.03, .26]	.41*** [.31, .50]	
12	.54*** [.45, .62]	-.02 [-.14, .10]	-.06 [-.18, .06]	.29*** [.18, .39]	-.18** [-.29, -.07]	.38*** [.28, .48]	.35*** [.24, .45]	-.06 [-.18, .06]	.12* [.00, .23]	-.16** [-.27,-.04]	.05 [-.07, .17]

Note. 1= Absorption and Obliviousness (DA-OBLIV; DES), 2= Challenging and Rewarding Experience (DFS), 3= Loss of Self-Consciousness (DFS), 4= Transformation of Time (ToT; DFS), 5= Enhanced Concentration (DFS), 6= Depersonalization and Derealization (DES), 7= Dissociative Amnesia (DES), 8= Unambiguous Feedback (DFS), 9= Merging of Action and Awareness (MoAA; DFS), 10= Sense of Control (DFS), 11= Clear Goals (DFS), 12= Dissociative Identity Tendency (DA-DID; DES). DES = Revised Dissociative Experiences Scale. DFS = Dispositional Flow Scale. 2. In brackets are 95% confidence intervals, *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

respectively. As can be seen in the table, the four DES factors were all strongly and significantly correlated with each other (Pearson's *r*'s ranging from .35 to .58, p<.001), suggesting that they are separate, yet related, factors. In contrast, the eight DFS factors showed a range of correlations (weak to strong), some of which were not significant. Importantly, ToT was uncorrelated with four other DFS factors and was in fact significantly inversely associated with "Enhanced Concentration". Furthermore, ToT was positively correlated with all four DES factors (*r*s ranging from .21 to .29, all p<.001). Similarly, but via a weaker relation, MoAA positively correlated with three out of the four DES factors. ToT and MoAA were the only DFS factors that correlated significantly with DES factors.

Factor Correlations with Self-Efficacy and Psychopathological Symptoms

Table 2 presents the partial correlations, controlling for sex, for each of the twelve factors with SE and psychopathological symptoms. As shown in the table, all four DES factors were inversely correlated with SE (*r*s range from -.20 to -.26, *p*<.001) and were associated with psychopathological symptoms (for the general BSI score: r's ranged from .36 to .45, p<.001; for the specific symptom scales: *r*s ranged from .18, *p*<.01 to .45, *p*<.001). Conversely, six out of the eight DFS factors (specifically, all factors other than ToT and MoAA) were associated with SE (*r*s ranged from .20 to .33, *p*<.001) and inversely related to psychopathological symptoms (for the general BSI score: *r*s ranged from -.24 to -.41, *p*<.001; for specific symptom scales, a variety of correlations (weak to strong, most of them moderate) at varied levels of significance). Once again, the two factors ToT and MoAA exhibited different relations than those measured for the other DFS factors. Specifically, their patterns of associations with SE and psychopathological symptoms were more like those of the DES factors. ToT correlated negatively with SE (*r* = -.18 [-.29, -.07], *p*<.01), and positively with psychopathological symptoms (for the general BSI score: *r* = .21 [.10, .32], *p*<.001; for specific symptoms scales: moderate to low correlations at various degrees of significance). MoAA correlated weakly with several psychopathological symptom scales. Inso-

Table 2

Partial Correlations (Controlling for Sex) of the Twelve EFA Factors (Columns), with Self-Efficacy and Psychopathological Symptoms (Rows).

	SE	BSI	S	OC	IS	A	D	H	PA	PI	P
1	-.26***	.41***	.34***	.43***	.33***	.38***	.20***	.36***	.38***	.33***	.34***
	[-.37,-.15]	[.31,.50]	[.23,.44]	[.33,.52]	[.22,.43]	[.28,.48]	[.09,.31]	[.25,.46]	[.28,.48]	[.22 .43]	[.23,.44]
2	.24***	-.24***	-.12*	-.22***	-.16**	-.23***	-.29***	-.26***	-.19***	-.07	-.17**
	[.13,.35]	[-.35,-.13]	[-.23,.00]	[-.33,-.11]	[-.27,-.04]	[-.34,-.12]	[-.39,-.18]	[-.37,-.15]	[-.30,-.08]	[-.19,.05]	[-.28,-.06]
3	.30***	-.28***	-.15*	-.26***	-.35***	-.26***	-.21***	-.18**	-.21***	-.24***	-.26***
	[.19,.40]	[-.38,-.17]	[-.26,-.03]	[-.37,-.15]	[-.45,-.24]	[-.37,-.15]	[-.32,-.10]	[-.29,-.07]	[-.32,-.10]	[-.35,-.13]	[-.37,-.15]
4	-.18**	.21***	.23***	.22***	.16**	.21***	.12*	.06	.22***	.10	.20***
	[-.29,-.07]	[.10,.32]	[.12,.34]	[.11,.33]	[.04,.27]	[.10,.32]	[.00,.23]	[-.06,.18]	[.11,.33]	[-.02,.21]	[.09,.31]
5	.30***	-.41***	-.30***	-.54***	-.31***	-.37***	-.30***	-.30***	-.30***	-.30***	-.28***
	[.19,.40]	[-.50,-.31]	[-.40,-.19]	[-.62,-.45]	[-.41,-.20]	[-.47,-.27]	[-.40,-.19]	[-.40,-.19]	[-.40,-.19]	[-.40,-.19]	[-.38,-.17]
6	-.22***	.42***	.37***	.31***	.27***	.39***	.29***	.26***	.45***	.32***	.44***
	[-.33,-.11]	[.32,.51]	[.27,.47]	[.20,.41]	[.16,.38]	[.29,.48]	[.18,.39]	[.15,.37]	[.35,.54]	[.21,.42]	[.34,.53]
7	-.20***	.36***	.40***	.33***	.25***	.31***	.18**	.29***	.35***	.30***	.28***
	[-.31,-.09]	[.25,.46]	[.30,.49]	[.22,.43]	[.14,.36]	[.20,.41]	[.07,.29]	[.18,.39]	[.24,.45]	[.19,.40]	[.17,.38]
8	.22***	-.24***	-.18**	-.28***	-.17**	-.21***	-.24***	-.15*	-.15**	-.15*	-.18**
	[.11,.33]	[-.35,-.13]	[-.29,-.07]	[-.38,-.17]	[-.28,-.06]	[-.32,-.10]	[-.35,-.13]	[-.26,-.03]	[-.26,-.03]	[-.26,-.03]	[-.29,-.07]
9	.00	.11	.16**	.00	.05	.08	.12*	.07	.15*	.08	.16**
	[-.12,.12]	[-.01,.22]	[.04,.27]	[-.12,.12]	[-.07,.17]	[-.04,.20]	[.00,.23]	[-.05,.19]	[.03,.26]	[-.04,.20]	[.04,.27]
10	.33***	-.40***	-.25***	-.35***	-.31***	-.36***	-.37***	-.33***	-.32***	-.33***	-.34***
	[.22,.43]	[-.49,-.30]	[-.36,-.14]	[-.45,-.24]	[-.41,-.20]	[-.46,-.26]	[-.47,-.27]	[-.43,-.22]	[-.42,-.21]	[-.43,-.22]	[-.44,-.23]
11	.20***	-.24***	-.16**	-.29***	-.16**	-.21***	-.27***	-.14*	-.19***	-.11	-.17**
	[.09,.31]	[-.35,-.13]	[-.27,-.04]	[-.39,-.18]	[-.27,-.04]	[-.32,-.10]	[-.38,-.16]	[-.25,-.02]	[-.30,-.08]	[-.22,-.01]	[-.28,-.06]

far as our results at this point in the study suggested that ToT and MoAA indeed represent dissociative flow scales, in subsequent immersion variable analyses we used the two DA-related DES factors and the two dissociative flow scales ToT and MoAA.

Moderation Analyses of Trait Measures

Next, we explored whether SE may moderate the relationships between immersion (DA or dissociative flow components) and psychopathology. We began the analyses with the DA-related dissociation factors (DA-OBLIV and DA-DID), which we used in two regression analyses that we ran to predict psychopathological symptoms. Each model also included SE and its interaction with the DA-related factor. In addition to the statistically significant positive main effects, statistically significant interactions emerged between each of the DA factors with SE (B = -0.01 [-0.014, -0.004], se = 0.00, t = -3.33, β = -.16, p = .001 for DA-OBLIV; B = -0.01 [-0.014, -0.002], se = 0.01, t = -2.59, β = -.12, p = .01 for DA-DID). Probes for the first statistically significant interaction, when treating DA-OBLIV as the focal predictor and SE as the moderator, revealed that, as hypothesized, DA-OBLIV positively predicted psychopathological symptoms only when SE was low (B = 0.22 [0.153, 0.277], se = 0.03, t = 6.85, β =.37, p <.001), but not when it was high (B = 0.07 [-0.016, 0.149], se = 0.04, t = 1.58, β =.11, p = .115). A slightly different pattern emerged for the interaction wherein DA-DID was the focal predictor. Probes revealed that DA-DID strongly and positively predicted psychopathological symptoms not only when SE was low (B = 0.25 [0.182, 0.323], se = 0.04, t = 7.04, β = .42, p <.001), but also when it was high, albeit less strongly (B = 0.12 [0.046, 0.202], se = 0.04, t = 3.12, β = .21, p = .002).

We conducted two similar regression models with the dissociative flow components (ToT and MoAA) as the focal predictors. In these analyses, there were only main effects (suggesting that higher dissociative flow components, and lower SE, are associated with

higher psychopathology), whereas the interaction terms were non-significant (*B* = -0.01 [-0.012, 0.001], *se* = 0.01, *t* = -1.55, β = -.08, *p* = .122, for ToT; B=-0.01 [-0.015, 0.000], *se* = 0.01, *t* = -1.85 β = -.09, *p* = .065, for MoAA), which does not support the moderation hypothesis vis-à-vis flow.

Phase 2

T-Tests for Group Comparisons

Independent samples *t*-tests to compare the high and low trait DA groups on trait flow and SE and on state DA, flow, and SE confirmed that these groups were indeed distinct. Additional information is detailed in the supplementary material.

Table 3 presents bootstrapped partial correlations (controlling for sex and group) between the state flow subscales and state DA. As can be seen in the table, DA correlated with MoAA (*r* = .37 [.09, .64]) and with ToT (*r* = .47 [.25, .65]). In addition, DA correlated with autotelic experience (*r* = .26 [.05, .45]). Correlations among the FSS subscales suggest that ToT correlated significantly with MoAA and with some of the non-dissociative subscales of flow (challenge and skill balance, clear goals, and autotelic experience). In contrast, MoAA was uncorrelated with six FSS subscales and inversely associated with the sense of control subscale of the FSS.

Correlations of State Immersion (Flow, DA) with State Sense of Self-Efficacy, Performance on Tetris, and Mood Change

Table 4 presents bootstrapped partial correlations (controlling for sex and group) among state flow and DA, on the one hand, and state SE, performance on the Tetris task, and positive and negative mood change, on the other. Of note are the associations be-

Table 3
Correlations (Controlling for Sex and Group) Between State Flow Subscales and State Absorption

	1	2	3	4	5	6	7	8	9
2	.07 [-.18, .31]								
3	*.47 [.24, .65]*	.05 [-.19, .29]							
4	*.46 [.23, .66]*	-.02 [-.27, .25]	*.79 [.67, .89]*						
5	*.57 [.32, .74]*	-.04 [-.27, .20]	*.53 [.34, .69]*	*.61 [.42, .74]*					
6	*.45 [.18, .67]*	*-.31 [-.56, -.05]*	*.55 [.30, .73]*	*.64 [.45, .79]*	*.71 [.53, .84]*				
7	.05 [-23, .34]	.03 [-.27, .34]	-.16 [-.37, .08]	.00 [-.23, .24]	.06 [-.13, .27]	.20 [-.02, 43]			
8	*.34 [.12, .51]*	*.27 [.02, .50]*	*.26 [.04, .48]*	.12 [-.12, .35]	.13 [-.13, .39]	.14 [-.10, .36]	-.16 [-.40, .11]		

9	*.49* *[.18, .73]*	.06 [-.17, .28]	*.33* *[.07, .60]*	*.40* *[.17, .65]*	*.48* *[.17, .74]*	*.46* *[.24, .68]*	-.04 [-.26, .23]	*.51* *[.33, .65]*	
10	.11 [-.15, .41]	*.37* *[.09, .64]*	.06 [-.16, .28]	-.07 [-.31, .19]	.01 [-.27, .29]	-.04 [-.31, .24]	-.27 [-.50, .03]	*.47* *[.25, .65]*	*.26* *[.05, .45]*

Note. Correlation coefficients for which the bootstrapped confidence interval excludes zero are italicized. 1= Challenge and Skill Balance, 2= Merging of Action and Awareness (MoAA), 3= Clear Goals, 4= Unambiguous Feedback, 5= Concentration on Task, 6= Sense of Control, 7= Loss of Self Consciousness, 8= Transformation of Time (ToT), 9= Autotelic Experience, 10= State DA. In brackets are 95% bootstrapped bias-corrected and accelerated confidence intervals.

Table 4

Correlations (Controlling for Sex and Group) Between State Flow Subscales and State Absorption, State Sense of Control, Maximum Lines Cleared in Tetris, and Changes in Mood

	State self-efficacy	Maximum lines cleared in Tetris	Positive mood change	Negative mood change
Challenge and Skill Balance	.47 [.23, .69]	.23 [-.03, .48]	.33 [.06, .53]	.13 [-.22, .41]
Merging of Action and Awareness (MoAA)	-.30 [-.57, .01]	.10 [-.18, .39]	.08 [-.18, .31]	-.06 [-.36, .21]
Clear Goals	.36 [-.02, .65]	.39 [.11, .62]	.09 [-.18, .31]	-.09 [-.36, .17]
Unambiguous Feedback	.48 [.17, .70]	.47 [.24, .66]	.15 [-.11, .38]	-.08 [-.35, .18]
Concentration on Task	.45 [.17, .69]	.34 [.14, .52]	.27 [-.03, .49]	-.10 [-.42, .20]
Sense of Control	.59 [.31, .80]	.19 [-.10, .44]	.11 [-.17, .36]	.08 [-.19, .33]
Loss of Self Consciousness	.23 [-.05, .50]	-.03 [-.26, .22]	-.24 [-.46, -.01]	.23 [-.01, .48]
Transformation of Time (ToT)	-.10 [-.34, .15]	.14 [-.14, .41]	.39 [.18, .57]	-.31 [-.48, -.12]
Autotelic Experience	.26 [-.03, .55]	.36 [.13, .54]	.48 [.24, .67]	-.05 [-.31, .20]
State DA	-.34 [-.49, -.06]	.00 [-.24, .26]	.27 [-.02, .48]	-.25 [-.57, .14]

Note. Correlation coefficients for which the bootstrapped confidence interval excludes zero are italicized. DA = Dissociative absorption. In brackets are 95% bootstrapped bias-corrected and accelerated confidence intervals.

tween the non-dissociative flow subscales and the outcome variables. Specifically, four of the flow factors (challenge and skill balance, unambiguous feedback, concentration on task, and sense of control) correlated with state SE in the Tetris task (rs ranged from .45 to .59), and four correlated with the maximum number of lines cleared in Tetris (specifically, clear goals, unambiguous feedback, concentration on task, and autotelic experience; rs range from .34 to .47). In addition, three of the non-dissociative flow subscales were associated with change in positive mood, but in different directions. Challenge and skill balance (r = .33 [.06, .53]) and autotelic experience (r = .48 [.24, .67]) correlated with change in positive mood, suggesting an enhancement of positive emotions. In contrast, loss of self-consciousness correlated negatively with change in positive mood, suggesting a decrease in positive emotions (r = -.24 [-.46, -.01]).

As for the two dissociative state flow subscales, MoAA was uncorrelated with any of the outcome variables (state SE, performance, and change in mood), and ToT was uncorrelated with state SE and performance. However, ToT was associated with change in positive mood (r = .39 [.18, .57]), and was the only variable that was inversely associated with change in negative mood (r = -.31 [-.48, -.12]), again suggesting mood improvement following the task. State DA was inversely associated with state SE (r = -.34 [-.56, -.10]), but was uncorrelated with performance or with change in mood.

Moderation Analyses Involving State Measures, Performance in Tetris, and Mood Change

We conducted bootstrapped regression analyses to explore the possible moderating role of state SE in the relations between state immersion (DA, ToT, MoAA) during the Tetris task, and the three outcome variables: task performance (maximum lines cleared), and positive and negative change in mood, controlling for sex.

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In three regression analyses that predicted objective task performance, with either state DA, state MoAA, or state ToT as predictors, the main effects were non-significant, as were the interaction terms (B = -0.08 [-0.251, 0.041], se = 0.08, β = -.19, for DA; B = -1.04 [-2.681, 1.549], se = 1.10, β = -.22, for MoAA; B = -0.80 [-2.492, 1.021], se = 0.94, β = -.15, for ToT), lending no support to the moderation hypothesis.

A regression model predicting change in negative mood showed an inverse main effect for ToT (B = -1.29 [-2.385, -0.341], se = 0.49, β = -.33), suggesting that those who experienced ToT experienced a decrease in negative emotions following the task, and a positive main effect for sex (B = 2.46 [0.290, 4.795], se = 1.14, β = .21), suggesting that men experienced an increase in negative emotions following the task. The interaction term was non-significant (B = 0.18 [-0.328, 0.703], se = 0.24, β = .16). In a regression model for the same predicted variable with MoAA as the predictor, only a positive main effect for state SE was found (B = 0.44 [0.008, 0.921], se = 0.24, β = .34), suggesting that those who felt more sense of SE during the task experienced an increase in negative emotions following the task. Again, the interaction term was non-significant (B = -0.01 [-0.829, 0.345], se = 0.36, β = -.01). As for state DA, the main effects and the interaction term were non-significant (B = 0.03 [-0.018, 0.057], se = 0.02, β = .31, for the interaction effect).

In regression models that predicted change in positive mood, MoAA did not have a significant main effect or interaction, but there was a negative main effect for sex (B = -5.02 [-9.110, -1.105], se = 2.01, β = -.27), suggesting again that men experienced a decrease in positive emotions following the task. In a similar model with ToT as the predictor, however, there was a significant positive main effect for ToT (B = 2.50 [0.976, 3.984], se = 0.79, β = .40) and a significant interaction term (B = -0.74 [-1.191, -0.196], se = 0.27, β = -.41). Probes for the interaction revealed that ToT predicted positive mood change only when

SE during the game was low (*B* = 5.41, [2.681, 7.412], *se* = 0.93, β = .87) but not when it was high (*B* = 0.20 [-1.738, 1.781], *se* = 1.46, β = .03). As for state DA, the main effect was significant (*B* = 0.22 [0.046, 0.363], *se* = 0.09, β = .32), suggesting that those with DA experienced an increase in positive emotions following the task. There was also a significant negative main effect for sex (*B* = -5.78 [-9.549, -1.813], *se* = 1.86, β = -.31), suggesting that men experienced a decrease in positive emotions following the task. Again, the interaction term was significant (*B* = -0.06 [-0.104, -0.011], *se* = 0.02, β = -.37). Probes for the interaction revealed that state DA predicted positive mood change only when SE during the game was low (*B* = 0.35 [0.109, 0.552], *se* = 0.12, β = .51), not when it was high (*B* = -0.05 [-0.281, 0.131], *se* = 0.12, β = -.07).

Discussion

Whereas DA has at times been regarded as maladaptive given its construal as a dissociative factor and its associations with psychopathology, its counterpart "flow," which includes similar immersion attributes, has consistently been considered adaptive, as it is associated with enhanced performance (but see Partington et al., 2009; Schüler & Nakamura, 2013). Previous studies failed to discern these two similarly defined constructs as unequivocally separate, thus leaving open the question of whether dissociation can be adaptive. In line with the view that dissociation and flow are not one and the same (Thomson & Jaque, 2012), in the current study they emerged as separate constructs, as they did not have combined factors, even when considering all of the factors with an Eigenvalue larger than 1. This finding contrasted with our hypothesis, according to which some of the DA and flow items may load on a combined immersion factor.

Despite this finding, we question the validity of the DFS-2 and FSS measures of a unified "flow" construct. Whereas overall, "dissociation" was a cohesive construct, "flow" components were not all positively related with each other and they exhibited varied patterns of associations with other variables. This finding, in line with those of previous studies, suggests that the flow construct lacks cohesiveness (Jackson & Eklund, 2002; Marin & Bhattacharya, 2013). Moreover, the non-cohesiveness of flow (as measured in this study) seemed to suggest that the subscales for assessing dissociation (ToT and MoAA) are maladaptive, as they were unrelated to task performance and positively related to dissociation and psychopathology. This observation is in line with recent findings showing an inverse pattern of associations of depersonalization with the different flow aspects (ToT, on the one hand, compared to sense of control, loss of self-consciousness, and autotelic experience, on the other hand, also assessed with the DFS-2; Thomson & Jaque, 2021). As expected, the trait loss of self-consciousness did not correlate with DA, despite its dissociative-sounding label, as this trait's items assess social disregard for evaluation by others, i.e., a factor that pertains to social cognitions rather than to a true dissociative subscale. Thus, a more suitable label may be "low concern for external evaluation." However, the state (FSS) loss of self-consciousness scale includes one item that seems to evaluate loss of self-consciousness rather than social cognition ("I was not worried about my performance during the event") and indeed, the state scale showed a slightly different pattern of associations from non-dissociative flow subscales, but the differences between the situational and dispositional measures of flow should be further explored. In any case, our results suggest that the clearly dissociative trait (DFS-2) subscales of flow are ToT and MoAA, and that these subscales are not necessarily adaptive. The non-dissociative aspects of the DFS-2 may be those responsible for the hypothesized long-term positive effect of flow and the elicitation of better performance in activities when one enters a state of flow. Accordingly, several non-dissociative FSS flow scales were related to better Tetris performance in Phase 2 of this study. These findings lead us to a broader question of

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whether and, if so, how, the absorptive aspects of flow affect mood. Some evidence in this study suggests that immersive states may have a positive, short-term effect on mood. Specifically, ToT correlated with an increase in positive emotions following Tetris, and state DA showed the same correlation in the moderation analyses and a positive correlation with autotelic experience.

Importantly, SE was found to moderate the immersion-mood association to some extent. Although our results did not support Butler's (2004) suggestion that DA may be beneficial when experienced with high SE, high trait SE either nullified or ameliorated the association of trait DA with trait psychopathology. This finding may indicate that the relation of DA with psychopathology may be complex but not necessarily maladaptive. For example, dissociation is often considered to be a coping method, and those capable of controlling their common dissociative experiences may be able to leverage them to their benefit in challenging situations. In the state phase, an unexpected pattern emerged, whereby a positive change in mood among immersed participants was noted only under low SE. Interestingly, a worsening of mood following the task related to either being a male or having high SE. Possibly, those who felt a stronger need to achieve performance goals (i.e., were more worried about scoring points) were less able to allow themselves to enjoy the task, to become immersed in it, and to play it for intrinsic pleasure alone. In this sample, males may have been more competitive in the context of a computer game than females. In any case, immersion was related to a decrease in negative emotion (regardless of SE) and an increase in positive emotion (only among those with low SE). These results show that, under certain conditions, state immersion may be positive. Relatedly, individuals with low SE were better able to exploit interventions for relaxation and emotional writing (Kraft et al., 2008). To integrate our trait and state findings, this momentary improvement in mood following immersion (ToT, DA) – albeit positive or pleasant in a specific moment (during a computer game) – may be problematic or maladaptive when experienced chronically, as our data indeed demonstrated that trait immersion (ToT, MoAA, DA) was associated with increased psychopathology. Further research is needed to establish whether this is the case and why, and to determine the direction of causality for this long-term association (e.g., does immersion at the expense of attunement to the environment lead to psychopathology, or vice versa, or both). In any case, immersion seems to be a complex phenomenon in terms of adaptivity.

Several suggestions emerge from our findings: first, the assumed unity of flow, at least as measured by the DFS-2 and FSS, should be re-evaluated; it seems that when using these measures, dissociation-related flow factors do not necessarily represent the same psychological construct as non-dissociative flow aspects such as clear goals, especially not when assessed as traits (with the DFS-2). Second, the presumed adaptivity of "flow," as assessed with these measures, should also be questioned, as its nature was not found to be unequivocally positive. Third, the emergence of a different pattern for the moderating effect of SE in Phase 1 versus that obtained in Phase 2 left us with the question of what truly the nature of flow and dissociation is, and what (if it exists) is the variable responsible for their positive versus negative influences.

Returning to our initial question of whether mild dissociative experiences may be adaptive in the context of flow, the current study suggests that when they are assessed as traits with the DFS-2, the answer is negative: rather than exhibiting a positive effect the dissociative aspects of flow showed patterns similar to DA. Conversely, when assessed as states with the FSS, immersion appears to be associated with enhanced mood (but not better performance).

Notably, although we demonstrated associations between trait immersion and psychopathology, this study did not examine potential associations with positive factors

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(e.g., well-being, creativity, activity). In addition, the study has several other limitations. First, since it is a correlational study, causality between the variables cannot be deduced. Our use of two assessment points in the state phase, however, enabled us to examine the influence of the task. Second, insofar as the participants were students the findings do not necessarily represent the general population. However, we believe that students constitute a suitable group upon which to explore the topic of individual differences in immersion tendencies and SE, and our results are likely valid at least vis-à-vis young adults, who were a focus of interest in this case. Third, in Phase 2 we sampled the participants from the high and low ends of the continuum of DA scores, a sampling approach that may have led to an abnormal distribution of the data. This means that the results of Phase 2 may not be generalizable to other populations (e.g., those including the middle scores on DA). To that end, we conducted bootstrapped analyses that do not assume a normal distribution and we controlled for the group variable when we examined correlations with state DA. The limited variance, however, may have affected the results found, indicating that further research is needed to replicate and generalize these results. Finally, we assessed performance with a single, very specific measure (Tetris, lines cleared), but had we relied on several measures perhaps we would have been able to detect a positive effect for immersion. For example, tasks involving physical skills (e.g., dance) or creativity-related problem solving may produce different performance results than Tetris. It should be noted, however, that among performing artists, ToT was positively associated with depersonalization, unlike other facets of flow that were explored and found to be negatively related (specifically, sense of control, loss of self-consciousness, and autotelic experience; Thomson & Jaque, 2021), thereby supporting the overall pattern found in our study. Further research that leverages state measures and designs to study performing artists could shed more light on these processes.

In conclusion, our findings elucidate the notion of "non-pathological dissociation," immersion, or "flow" in the setting of a positive and enjoyable experience. At least in this investigation, DA and the dissociative domains of flow did not demonstrate an advantage in terms of an inverse relation with psychopathology or enhanced task performance. On the contrary, the tendency to become immersed (whether measured with a dissociation or a flow questionnaire) was associated with psychopathology. The previously reported positive effect of flow may have been the result of specific aspects of the concept unrelated to dissociation, but it is also possible that different flow measures can better capture positive dissociative flow. The results of this study nonetheless indicate that some of the dissociative domains of flow may effect short-term improvements in mood, especially among individuals with low SE. The contributions to the field made by our study notwithstanding, further research is needed to examine the notion of "non-pathological dissociation" in common, everyday situations to improve our understanding of the distinction between adaptive and potentially maladaptive experiences.

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Sind Sie "in der Zone" oder "abgetrennt"? Eine Untersuchung von Flow, dissoziativer Absorption und ihren angepassten versus fehlangepassten Korrelaten

Michal Zadik, Noa Bregman-Hai, und Nirit Soffer-Dudek

Zusammenfassung: Zielsetzung: Die Begriffe dissoziative Absorption und Flow beschreiben Tendenzen beim Erleben eindringlicher Bewusstseinszustände, wobei Dissoziation manchmal als fehlangepasst gilt, während Flow typischerweise als angepasst angesehen wird. Wir untersuchten ihre Trait- und Stateassoziationen mit Psychopathologie, Spielleistung und Stimmung und untersuchten den hypothetischen Moderationseffekt von Selbstwirksamkeit. Methode: In der vorliegenden Studie füllten 303 Studenten Traitfragebögen aus, und 63 Hoch-/Niedrig-Absorber berichteten über ihren Zustand vor und nach einer fesselnden Aufgabe ("Tetris"). Die Aufgabenleistung wurde ebenfalls bewertet. Ergebnisse: Wir fanden heraus, dass sich Flow von Dissoziation unterschied, aber inkonsistent war; zwei seiner Komponenten ("Transformation der Zeit" (TdZ) und "Verschmelzung von Handlung und Aufmerksamkeit" (VvHA)) waren positiv mit Dissoziation und Psychopathologie assoziiert und standen - im Gegensatz zu anderen Flow-Komponenten - in keinem Zusammenhang mit verbesserter Aufgabenleistung. Obwohl die Trait-Assoziationen von TdZ und VvHA mit Psychopathologie nicht vom Selbstwirksamkeitsniveau abhängig waren, war die Trait-Dissoziation bei geringer Selbstwirksamkeit stärker mit Psychopathologie verknüpft. In der State-Phase war die Zustandseindringlichkeit (sowohl TdZ als auch dissoziative Absorption) mit einer Stimmungsverbesserung verbunden, insbesondere bei geringer Selbstwirksamkeit. Schlussfolgerung: Unsere Ergebnisse veranlassen uns, die Gültigkeit von Flow als zusammenhängendes Konstrukt in Frage zu stellen, wie es mit der Dispositional Flow Scale-2 gemessen wird. Eindringliche Erfahrungen, einschließlich TdZ und dissoziativer Absorption, führten zu einer kurzfristigen Stimmungsverbesserung in der State-Phase, aber in Anbetracht ihrer Trait-Assoziationen mit Psychopathologie könnte ein übermäßiges Verweilen in diesen Bereichen auf lange Sicht fehlangepasst sein.

Eberhard Bauer

Você está "*In the Zone*" ou "Desconectado"? Uma Investigação sobre "*Flow*", Absorção Dissociativa, e seus Correlatos Adaptativos versus Correlatos Mal-adaptativos

Michal Zadik, Noa Bregman-Hai, e Nirit Soffer-Dudek

Resumo: Objetivo: Os termos absorção dissociativa e "*flow*" descrevem tendências a experimentar estados de consciência imersiva, embora a dissociação seja, por vezes, considerada mal-adaptativa enquanto que o "*flow*" é tipicamente considerado adaptativo. Exploramos suas características e estados associados com psicopatologias, performance em jogos e humor, e examinamos o efeito hipotético moderador da autoeficácia. Método: No presente estudo, 303 estudantes universitários completaram questionários sobre traços de personalidade e 63 deles, com alta ou baixa assimilação, relataram seu estado antes e depois de uma tarefa imersiva ("Tetris"). A performance em tarefas também foi avaliada. Resultados: Descobrimos que o "*flow*" distinguia-se da dissociação, mas era inconsistente; dois de seus componentes ("transformação da noção de tempo" (ToT, em inglês) e "fusão da ação e consciência" (MoAA, em inglês)) estavam positivamente associados à dissociação e psicopatologias e, ao contrário de outros componentes do "*flow*", não mostravam-se relacionados com o desempenho aprimorado de tarefas. Embora as associações de características dos componentes ToT e MoAA com psicopatologias não dependessem dos níveis de autoeficácia, características de dissociação estavam mais fortemente relacionadas a psicopatologias quando em contexto de baixa autoeficácia. O estado de imersão (tanto ToT como absorção dissociativa) demonstrou-se associado à melhora do humor, especialmente em contexto de baixa autoeficácia. Conclusão: Nossos resultados nos levam a questionar a validade do "*flow*" como uma construção coesa, conforme medido pela Dispositional Flow Scale-2. Experiências imersivas, incluindo ToT e absorção dissociativa, levaram a uma melhoria do humor a curto prazo, mas, considerando suas associações características com psicopatologias, envolver-se com elas excessivamente poderia ser mal-adaptativo a longo prazo.

Antônio Lima

¿Estás "en la Zona" o "Desconectado"? Flujo, Absorción Disociativa, y sus Correlatos Adaptativos y Desadaptativos

Michal Zadik, Noa Bregman-Hai, y Nirit Soffer-Dudek

Resumen: Objetivo: Los términos absorción disociativa y flujo (flow) describen la tendencia a experimentar estados de conciencia inmersiva, aunque a veces se considera a la disociación como desadaptativa, en tanto que se considera al flujo como típicamente adaptativo. Exploramos sus asociaciones de rasgo y estado con la

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psicopatología, el rendimiento en un juego y el estado de ánimo, y examinamos el efecto moderador hipotético de la autoeficacia. Método: En el presente estudio, 303 estudiantes universitarios completaron cuestionarios de rasgos y 63 altos/bajos en absorción informaron de su estado antes y después de una tarea de inmersión ("Tetris"). También se evaluó el desempeño en la tarea. Resultados: Encontramos que el flujo se distinguía de la disociación pero inconsistement; dos de sus componentes ("transformación del tiempo" (ToT) y "fusión de la acción y la consciencia" (MoAA)) estaban asociados positivamente con la disociación y la psicopatología, y, a diferencia de otros componentes del flujo, no se relacionaron con un mayor rendimiento en la tarea. Aunque las asociaciones de rasgo de ToT y MoAA con la psicopatología no dependieron de los niveles de autoeficacia, la disociación de rasgo se relacionó más fuertemente con la psicopatología bajo baja autoeficacia. En la fase de estado, la inmersión en el estado (tanto el ToT como la absorción disociativa) se asoció con la mejora del estado de ánimo, especialmente bajo baja autoeficacia. Conclusión: Nuestros resultados nos llevan a cuestionar la validez del flujo como un constructo cohesivo, medido según la Escala de Flujo Disposicional-2. Las experiencias inmersivas, incluyendo el ToT y la absorción disociativa, condujeron a una mejora del estado de ánimo a corto plazo en la fase de estado, pero, teniendo en cuenta sus asociaciones de rasgos con la psicopatología, participar en ellas excesivamente puede ser desadaptativo a largo plazo.

Etzel Cardeña

Supplementary Material

Data Analyses

In Phase 1, we conducted an exploratory factor analysis (EFA) with DES-II and DFS-2 items, used principal axis factoring (PAF) with oblique rotation (oblimin method, which allows for the factors to be inter-correlated), and interpreted the pattern atrix. In the linear regression analyses we conducted on Phase 1 data, each model relied on a DA-related factor which emerged in the EFA (whether stemming from the DES or the DFS), SE, controlling for gender, in the prediction of psychopathological symptoms. After exploring main effects, the interaction term between the first two predictors was added. The continuous predictor SE was centered beforehand (EFA factors had an average of zero, so there was no need for centering the DA-related variables). Gender was dummy coded as men = 1, and women = 0. For probing interactions, simple slope analyses were employed. Those high and low in SE (the moderator) were represented by one standard deviation above and below the mean, respectively (Aiken & West, 1991; Cohen et al., 2003). Two-tailed statistical significance tests were used, $p = .05$.

In Phase 2, due to the small sample size, we calculated partial correlations with the two groups collapsed into one, and the group variable controlled for, which enabled assessing the relationships of state immersion with other state variables, regardless of trait tendencies.

Results

Table S1 details mean and standard deviations of all trait variables in the study (dissociation, flow, self-efficacy, and psychopathology), along with their subscales.

EFA Factors

Due to lack of space, the table with the full results of the EFA is not included here but can be obtained from the authors. Specifically, Factor 1 consisted of seven DES items, mostly associated with the DA subscale; the items reflect the tendency to become absorbed in external or internal stimuli, resulting in obliviousness to the environment. Thus, it was labeled “Absorption and Obliviousness” (DA-OBLIV). Factor 2 included all four DFS items which assess autotelic experience and three DFS items that assess balance between the challenge of the action and one’s skills. Hence, it was labeled “Challenging and Rewarding Experience”. Factor 3 consisted of all four DFS items which assess the degree with which one is occupied by the evaluation of others, and therefore was labeled “Loss of Self Consciousness”, as the original name of the corresponding DFS scale. Factor 4 comprised all four DFS ToT subscale items, which relate to experiencing an alteration in the sense of time, hence, we kept the original label. Factor 5 included four DFS items which assess concentration on the task, and one DFS item which assesses control over one’s thought processes. It was labeled “Enhanced Concentration”. Factor 6 consisted of six DES items reflecting the tendency to experience detachment from one’s self or from reality,

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Table S1

Descriptive Statistics for Trait Variables (Phase 1)

	Mean	SD	Minimum	Maximum
DES total score	13.48	11.87	0.00	67.14
DES amnesia	7.49	10.84	0.00	58.75
DES dep-der	5.04	9.91	0.00	55.00
DES dissociative absorption (DA)	21.48	16.74	0.00	77.78
DFS-2 total score	3.30	0.47	1.63	4.94
DFS-2 Challenge skill	3.61	0.61	1.50	5.00
DFS-2 Merging action awareness	2.71	0.65	1.00	5.00
DFS-2 Clear goals	3.64	0.71	1.50	5.00
DFS-2 Feedback	3.63	0.75	1.50	5.00
DFS-2 Concentration	3.26	0.88	1.00	5.00
DFS-2 Sense of control	3.62	0.74	1.25	5.00
DFS-2 Loss of consciousness	2.78	0.92	1.00	5.00
DFS-2 Transformation of time	2.91	0.87	1.00	5.00
DFS-2 Autotelic experience	3.54	0.69	1.00	5.00
SCS Self efficacy subscale	5.98	8.24	-18.00	27.00
BSI total score	0.75	0.55	0.00	3.25
BSI Somatization	0.46	0.55	0.00	3.14
BSI obsessive-compulsive	1.12	0.77	0.00	3.67
BSI interpersonal sensitivity	0.95	0.83	0.00	4.00
BSI anxiety	1.01	0.69	0.00	4.00
BSI depression	0.98	0.75	0.00	3.50
BSI hostility	0.49	0.60	0.00	4.00
BSI phobic anxiety	0.51	0.54	0.00	3.20
BSI paranoid ideation	0.62	0.66	0.00	3.25
BSI psychoticism	0.65	0.68	0.00	3.20

Note. DES = Dissociative Experiences Scale; DFS = Dispositional Flow scale. SCS = Self-Control Schedule; BSI = Brief Symptom Inventory

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and was thus labeled "Depersonalization and Derealization". Factor 7 consisted of eight DES items reflecting memory loss and inability to recall personal information. It was labeled "Dissociative Amnesia". Factor 8 comprised all four DFS unambiguous feedback subscale items, which reflect one's clear sense about one's performance, hence, the original label was kept. Factor 9 consisted of all four DFS MoAA subscale items, which reflect a sense that things happen spontaneously and automatically, and again the label was unchanged. Factor 10 included four items from the DFS which portray the tendency to feel control over one's action, body, and skills, and was thus labeled "Sense of Control". Factor 11 included three of the four clear goals DFS subscale items, which assess the degree to which one knows what one wants to achieve, and it was thus labeled "Clear Goals". Finally, Factor 12 included seven DES items, some characteristic of DA and some general items which usually are not included in any scale; all of the items of Factor 12 reflect the tendency to split and alter consciousness in a way that seems to be reminiscent of Dissociative Identity Disorder features. Thus, the factor was labeled "Dissociative Identity Tendency" (DA-DID). Figure S1 presents the scree plot for EFA and Table S2 represents the correlations between factors.

Figure S1

Scree Plot for the Factor Analysis

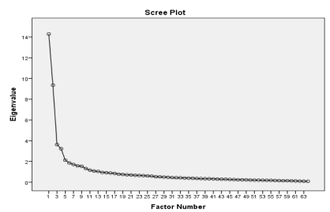

Table S2

Correlations Between Factors

	1	2	3	4	5	6	7	8	9	10	11
1											
2	.02										
3	-.18**	.18**									
4	.29***	.30***	.05								
5	-.29***	.29***	.31***	-.13*							
6	.43***	-.09	-.08	.21***	-.19**						
7	.57***	-.07	-.07	.24***	-.23***	.49***					
8	-.01	.39***	.18**	-.07	.41***	-.13*	-.08				
9	.10	.27***	.27***	.26***	.16**	.16**	.15*	.16**			
10	-.11	.33***	.22***	-.05	.39***	-.17**	-.06	.37***	.16**		
11	.07	.39***	.08	-.04	.40***	-.08	-.01	.55***	.15*	.41***	
12	.53***	-.03	-.05	.28***	-.18**	.37***	.35***	-.05	.12*	-.16**	.04

Note. 1= Absorption and obliviousness (DA-OBLIV; DES), 2= Challenging and rewarding experience (DFS), 3= Loss of self-consciousness (DFS), 4= Transformation of Time (ToT; DFS), 5= Enhanced concentration (DFS), 6= Depersonalization and derealization (DES), 7= Dissociative amnesia (DES), 8= Unambiguous feedback (DFS), 9= Merging of action and awareness (MoAA; DFS), 10= Sense of control (DFS), 11= Clear goals (DFS), 12= Dissociative identity tendency (DA-DID; DES). DES = Revised Dissociative Experiences Scale. DFS = Dispositional Flow Scale-2. In brackets are 95% confidence intervals $*p \leq .05$, $**p \leq .01$, $***p \leq .001$

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T-tests Comparing Groups

Table S3 presents bootstrapped independent-samples *t*-tests between the high and low trait DA groups, on several Phase 1 and Phase 2 flow/DA variables as well as SE. Regarding Phase 1, we used the original DFS subscales for this analysis, as the latent factors we presented above are based on the full Phase 1 sample and may not necessarily be accurate for this subsample. Compared to the low DA group, the high DA group showed significantly higher scores in dissociative variables, specifically, in MoAA and ToT (based on both Phase 1 DFS scores and Phase 2 FSS scores), and state absorption. Additionally, the high DA group showed significantly lower scores in SE (again, based on both the Phase 1 SCS subscale and Phase 2 state SE). Finally, the high DA group showed significantly lower scores in some of the non-dissociative subscales of flow (specifically, in sense of control as measured in both phases, and clear goals, unambiguous feedback, and concentration on task, as measured in Phase 1).

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Table S3

Bootstrapped T-Tests Between High and Low Trait DA, on Phase 1 and Phase 2 Flow/Absorption Variables

	Low absorption group *M (SD)*	High absorption group *M (SD)*	Mean difference [Bootstrapped 95% BCa CI]	*se*
DFS-2 original subscales				
Challenge and skill balance	3.68 (0.64)	3.47 (0.84)	-0.21, [-0.574, 0.160]	0.18
Merging of action and awareness	*2.51 (.71)*	*2.992 (.73)*	*0.48, [0.132, 0.786]*	*0.18*
Clear goals	*3.94 (.57)*	*3.52 (.85)*	*-0.42, [-0.782, -0.055]*	*0.19*
Unambiguous feedback	*3.93 (.72)*	*3.42 (.97)*	*-0.52, [-0.922, -0.095]*	*0.22*
Concentration on task	*3.68 (.77)*	*3.01 (1.05)*	*-0.67, [-1.118, -0.207]*	*0.23*
Sense of control	*3.98 (.55)*	*3.21 (.91)*	*-0.77, [-1.125, -0.410]*	*0.18*
Loss of self-consciousness	2.97 (1.00)	2.75 (1.16)	-0.22, [-0.767, 0.287]	0.27
Transformation of time	*2.63 (.92)*	*3.52 (.83)*	*0.88, [0.455, 1.346]*	*0.22*
Autotelic experience	3.39 (.82)	3.58 (.82)	0.19, [-0.211, 0.637]	0.20
FSS				
Challenge and skill balance	4.09 (.75)	4.14 (.62)	0.04, [-0.284, 0.377]	0.17
Merging of action and awareness	*1.85 (.81)*	*2.53 (1.04)*	*0.68, [0.217, 1.158]*	*0.24*
Clear goals	4.32 (.67)	3.94 (.76)	-0.38, [-0.737, 0.022]	0.17
Unambiguous feedback	4.26 (.84)	4.00 (.70)	-0.26, [-0.620, 0.148]	0.19

Note. BCa= bias-corrected and accelerated. DFS-2= Dispositional Flow Scale-2. FSS= Flow State Scale.

Correlation coefficients for which the bootstrapped confidence interval excluding zero are italicized.

Psychophysical Effects on an Interference Pattern in a Double-Slit Optical System: An Exploratory Analysis of Variance[1,2]

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Abstract: *Objective*: A two-year online experiment tested the hypothesis that focused human attention alternatively directed toward or away from a double-slit optical system would affect the interference pattern in a predictable, unidirectional fashion. A control condition was employed by having a web server periodically simulate a human observer. *Method*: Based on the results of an independent reanalysis of these data and the outcome of an independent conceptual replication, we revisited the original directional hypothesis to explore the possibility that mind-wandering and other distractions might have caused attention or intention to unpredictably fluctuate. That in turn might have caused the hypothesized psychophysical influence to be more readily detected as a bidirectional effect (i. e., a shift in variance) rather than as unidirectional effect (a shift in mean). To test this idea, we developed a variance-based analysis using data collected during the first year of the experiment and applied it to data from the second year. *Results*: The first year's data showed that experimental sessions conducted by humans resulted in significant variance differences as compared to control sessions conducted by a computer, z = 4.16, p = .00002. The same analysis applied to the second year's data resulted in z = 3.14, p = .0008. Examination of environmental and apparatus variables indicated that those factors were not responsible for the observed changes in variance. Conclusion: The results suggest that a variance analysis may be more sensitive to psychophysical effects in this type of experiment.

Keywords: mind-matter interaction, collapse of the wavefunction, double-slit interference

Highlights

- Mind-matter interaction experiments testing how intention influences physical systems often use hypotheses evaluated by mean-shift or unidirectional metrics.
- This approach may not be optimal because of the unavoidable effects of mind-wandering and other distractions.
- Because attention and intention can fluctuate moment to moment, use of a variance or equivalent bidirectional metric may be a more robust way to evaluate an effect.

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[2] The authors are grateful to the Bial Foundation, the Federico and Elvia Faggin Foundation, Inc., and Richard and Connie Adams for funding the experiment used to collect the data reanalyzed in this study, and to the members and donors of the Institute of Noetic Sciences for their generous support. We also thank two anonymous reviewers for their valuable comments and suggestions.

https://doi.org/10.31156/jaex.24054

• This approach was used in a reanalysis of previously recorded data in an online mind-matter experiment, resulting in a statistically clearer outcome.

Questions about the role of consciousness in the physical world have been debated by philosophers for millennia (Erich, 1999). Similar questions were posed by scientific pioneers. For example, in 1627, Sir Francis Bacon published Sylva Sylvarum, one of the first written works that helped to establish empirical research at the foundations of science (Bacon, 1639). Before Bacon, those seeking reliable answers to questions about the nature of Nature would have been advised to consult Aristotle (Wörner, 2001).

In Sylva Sylvarum, Bacon proposed that empiricism could be applied to many topics, including the study of mental intention, which he called the "force of imagination." To do this, one would use objects that, in Bacon's words, "have the lightest and easiest motions … [such as] the motions of shuffling of cards, or casting of dice…." (Bell, 1964). His proposal about tossing dice presaged future studies of mind-matter interaction by some three hundred years (Radin, 2006; Radin & Ferrari, 1991).

Today, Bacon's musings about the force of imagination can be found in a new form. As physicist Richard Feynman famously put it, it resides in "the heart of quantum mechanics" (Feynman et al., 1965). Feynman was referring to the fact that a quantum object behaves differently when it is observed than when it is not observed. This "quantum measurement problem" appears to violate the common-sense assumption that physical reality does not depend on observation (Myrvold, 2018). In the vernacular, it is reasonable to assume that the moon is still there even when you are not looking at it, but that everyday truism may not hold when dealing with the world at the quantum scale (Leggett, 1998; Josephson, 2002).

The measurement problem was discussed and debated by many of the founders of quantum theory, including Bohr, de Broglie, Heisenberg, Schrödinger, Eddington, Jordan, Pauli, Planck, Jeans, London, Wigner, and Bohm (Rosenblum & Kuttner, 2006). All were concerned about the epistemological and ontological challenges presented by quantum theory. Some, like Jordan, Schrödinger, von Neumann, and Bohm specifically proposed that some aspect of consciousness was responsible for the behavior of physical reality (Radin et al., 2012). Those proposals did not imply the philosophical position of idealism, whereby the physical world is said to emerge from consciousness, but rather that mind interacts with matter and that such interactions are instrumental in the unfolding of the physical world. This is in alignment with the philosophy of dual-aspect monism (Atmanspacher & Rickles, 2022).

For example, consider this statement from Jordan: "Observations not only disturb what is to be measured, they produce it. We compel [the electron] to assume a definite position. We ourselves produce the results of measurement" (Marin, 2009, p. 818). Some might object that this quote is taken out of context or misrepresents Jordan's position, but that is unlikely because Jordan was explicitly interested in mind-matter interaction as evidenced by an article he published in the Journal of Parapsychology entitled "Reflections on parapsychology, psychoanalysis, and atomic physics" (Jordan, 1951), and by an article on a related theme that he later published in the International Journal of Parapsychology (Jordan, 1960).

In a similar vein, Schrödinger wrote: "It is then quite clear that a measurement of x affects not only (as is always said) p [x's momentum], but also x itself. You have not found a particle at K' [x's definite position], you have produced one there! … Before the second measurement, it is ubiquitous in the cloud (it is not a particle at all)" (Schrödinger, 1995, p. 106). And again, " … [t]he observer is never entirely replaced by instruments; for if he were, he could obviously obtain no knowledge whatsoever … . Many helpful devices can facilitate his work … But they must be read! The observer's senses have to step in eventually. The most careful record, when not inspected, tells us nothing" (Schrödinger, 1992, p 162).

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John von Neumann used the term "psychophysical" to refer to mind-matter interactions in his proposal that the chain of possible interactions that occur between physical entities during the measurement process must at some point be "cut," thereby converting quantum potentials into classical actuals, and that this would occur only when knowledge of the measurement was registered by the observer's mind (von Neumann, 1955).

David Bohm too was interested in the mind-matter relation, as reflected by an invited talk he gave to the American Society for Psychical Research, later published in its journal, on "A new theory of the relationship of mind and matter" (Bohm, 1986). In that talk he said:

> One may then ask: what is the relationship of [mind and matter]? The answer that I want to propose here is that there are no two processes. Rather, I would suggest that both [mind and matter] are essentially the same. This means that that which we experience as mind, in its movement through various levels of subtlety, will in a natural way ultimately reach the level of the wavefunction and of the "dance" of the particles. There is no unbridgeable gap or barrier between any of these levels (Bohm, 1986, p. 113).

Related themes can be found in the writings of Wheeler, Stapp, Penrose, and other contemporary physicists. While this concept is not the leading consensus among most physicists today, neither is it a trivial minority. For example, in 2016, a survey was conducted among physicists interested in foundational questions about quantum mechanics (Sivasundaram & Nielsen, 2016). One of the questions was: "In your opinion [do you think] the observer (a) is a complex quantum system, (b) should play no fundamental role whatsoever, (c) plays a fundamental role in the application of the formalism, but plays no distinguished physical role, or (d) plays a distinguished physical role." Of the 150 respondents, 22% selected option (d). This suggests that a sizeable minority of physicists today agree that the formation of physical reality involves some sort of mind-matter interaction.

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Despite the historical and continuing scientific interest in the mind-matter relationship, few physicists today are empirically exploring this topic. Perhaps this is because of the siloed nature of academic disciplines, which constrains the range of topics accepted as relevant. But this is not to say that there are no pertinent results reported in the peer-reviewed literature. Many physical targets have been used to explore the "force of imagination," including cell cultures (Radin, Taft & Yount, 2004), plants (Shiah et al., 2017), variations in human mood (Shiah & Radin, 2013) and human physiology (Schmidt et al., 2004), and also in nonliving systems such as water (Radin et al., 2020; Schwartz et al., 2015), tossed dice (Radin & Ferrari, 1991), truly random number generators (Bosch et al., 2006; Radin et al., 2006; Radin & Nelson, 1989), and interference patterns generated by optical systems (Guerrer, 2019; Ibison & Jeffers, 1998; Radin et al., 2012, 2013, 2015, 2016, 2021). Overall, these studies suggest that small magnitude but statistically significant effects can be independently observed and replicated in controlled experiments (Cardeña, 2015, 2018).

That said, these effects are not trivial to reproduce because the task at hand is not simply a physics experiment, but one that involves poorly understood interactions between mind and matter. Conducting these studies thus also requires careful consideration of psychological factors like motivation, belief, and expectation, cognitive factors like the ability to maintain tightly focused attention, and also a host of potential unconscious influences (Carpenter, 2015).

When seeking to detect small magnitude effects, it is necessary to obtain adequate statistical power. To help achieve this, we conducted an online experiment where the psychophysical target was a double-slit optical system (Radin et al., 2016). That experiment was part of a series of studies using similar apparatus (Radin et al., 2021), which were deemed uniquely suitable for studying mind-matter interaction effects because an optical interferometer provides several pathways by which an influence might occur. One involves influencing components of the apparatus itself, including the laser power, the ori-

entation of the beam, the camera electronics, the path of individual photons, and so on. Another is that if one could gain knowledge about which of the two slits the photons passed through (i.e., so-called "which-path" information), then the wave-like nature of the interference would shift into a particle-like diffraction pattern in proportion to the accuracy of the knowledge gained. In either case, attention- or intention-associated effects might alter the interference pattern in detectable ways.

The present reanalysis of the previously published experiment was motivated by four factors. The first was an independent double-slit replication reported by Guerrer (2019). In a series of pilot tests, he reported confirmation of the directional hypothesis that consciousness would "collapse" the interference pattern. However, in follow-up formal studies, there was no evidence for a directional effect using the planned analysis, but post-hoc he found a significant bidirectional effect.

The second motivation was a reanalysis of the data gathered in this online study by Tremblay (2019). In his first published analysis, he confirmed that a significant effect was observed in one year of a two-year dataset. In a later correction, he found that a data trimming method we had used to remove outliers inadvertently inflated the p-values (Tremblay, 2021), which had been previously noted by Walleczek & von Stillfried (2019). We should note that we had also reported results with data that were not trimmed, and that outcome remained statistically significant, so the shortcoming in our outlier rejection procedure did not change the interpretation of the results (Radin et al., 2016, p. 20). Based on his analysis, Tremblay concluded in his latter paper that, "We observe, as in [the 2019 article] shifts in fringe visibility in the direction expected by the mind-matter interaction hypothesis. However, these shifts are not deemed significant ($p > 0.05$). Our re-analysis concludes that this particular dataset does not contain evidence of mind-matter interaction" (Tremblay, 2021, p.1).

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The third motivation was a reanalysis of another experiment we had conducted (and which was also critiqued by Walleczek & von Stillfried (2019)), in which we found a highly significant difference in variance of data collected in experimental sessions as compared to data collected in time- and protocol-matched control sessions (Radin et al., 2021).

The fourth motivation was a reconsideration of potential unconscious factors involved in these kinds of experiments (Carpenter, 2004, 2005, 2015; Eisenbud, 1983). Conscious attention and intentions can be distorted or overridden by unconscious undercurrents, leading to experimental results called "psi-missing" (statistically significant results opposite to the intended results), decline effects, and other oddities that tend to reduce or otherwise confound predicted outcomes (Kennedy, 2003).

Given these ideas, we revised our original directional hypothesis and instead postulated that psychophysical effects in this kind of experiment might be more easily detectable as a bidirectional effect. To explore this possibility, we developed an analytical approach that assumed that mind-matter influences are unstable because of mind-wandering and other distractions (Brandmeyer & Delorme, 2020; Schooler et al., 2011; Zwarun & Hall, 2014). To do this, we compared differences in variance between the two attentional conditions in sessions conducted by humans, as compared to the same differences in control sessions conducted by a computer.

Method

Details about the apparatus, methods, and procedures used in this experiment are described in a previous publication (Radin et al., 2016). For convenience, they are briefly repeated here. The new analytical approach is described in more detail later in this section.

Apparatus

The double-slit apparatus consisted of five key components: (1) 5 mW linearly polarized HeNe laser (Melles-Griot Model 25 LHP 151-249, 632.8 nm, Melles-Griot, Albuquerque, NM, USA), (2) two 10% transmission neutral density filters (Rolyn Optics, Covina, CA), (3) a double-slit slide with 10 µm slit widths separated by 200 µm (Lenox Laser, Glen Arm, MD, USA), (4) a 3000 pixel CCD line camera (Thorlabs Model LC1-USB, Newton, NJ, USA), and (5) a Melles-Griot regulated power supply, rated at ±2% power drift per hour.

The camera was located 16 cm from the slits, and light intensity was integrated for 40 ms. The optical apparatus was housed inside a sealed aluminum housing painted matte black inside and out, and the laser and camera were powered on continuously. The optical system was located on an equipment rack near the web server in the laboratory of the Institute of Noetic Sciences.

The experiment was controlled by a Windows XP computer running a web server program written in Matlab (version 2009b, MathWorks, Natick, MA, USA) and augmented with Thorlabs software libraries. The web server captured interference patterns from the camera at approximately 16 frames per second, and every fourth camera frame was recorded for offline analysis and simultaneously uploaded to a cloud storage system.

Procedures

Anyone with internet access was allowed to participate in this experiment. After navigating to the experiment's website and agreeing to the informed consent, they were invited to shift their attention toward or away from the optical system according to voice instructions that would announce the beginning of attentional epoch. The spoken phrase "now please concentrate" indicated a focus-toward epoch, and the phrase "now you may relax" indicated a withdrawal of focus epoch.

The concentrate epochs were uniformly 30 s in length. These were counterbalanced with relax epochs, each of which was randomly varied from 30 to 35 s in length. The random length relax epochs were used to help decouple the concentrate epochs from potential periodicities that might arise in the interference pattern due to periodic ambient environment factors or cycles in laser power. Each test session consisted of a series of 21 alternating epochs, starting with relax, for a total length of approximately 11 minutes.

A participant who wished to start an experimental session clicked a button on their browser. If the optical system was being used at that time, either by another person or by the web server acting as a "robot" or control user, a message would inform the person to come back in a few minutes. If the system was available, the experiment would begin.

During concentrate epochs a line graph was drawn on the browser to provide the user with real-time feedback about the nature of the interference pattern. No line was drawn during relax epochs. In 2013, the direction that the line moved was programmed such that if the wave-like interference pattern shifted toward a particle-like diffraction pattern, then the line went up. In 2014, the feedback was inadvertently reversed, such that the line went up as the interference pattern became more wave-like. For more details about the feedback, see the original article (Radin et al., 2016).

Hypothesis

The general hypothesis tested by this reanalysis was that consciousness directed toward a double-slit optical system would cause changes in the interference pattern. These changes would sometimes reflect the intentions of the participants, but at other times and in unpredictable ways other outcomes may arise. Thus, the specific hypothesis explored here predicted that the absolute difference in variance between the concentrate and relax conditions would be larger in sessions observed by humans, as compared to the same metric when observed by a computer ("robot" participants).

The analytical method described in the next section was developed first on data collected during the calendar year 2013. Then the same analysis was applied to the data

from 2014. After those two analyses was performed, all data were combined to further investigate the hypothesized effect.

Analysis

Figure 1 (top) shows the interference pattern observed by the line camera, averaged over 2,400 images collected in one session. Figure 1 (bottom) shows the log of the real portion of the Fourier transform associated with that pattern, from wavenumbers 1 through 60. The peak at wavenumber 42 is associated with the double-slit (DS) component of the interference pattern, and it is the metric of interest (henceforth referred to as "DS power").

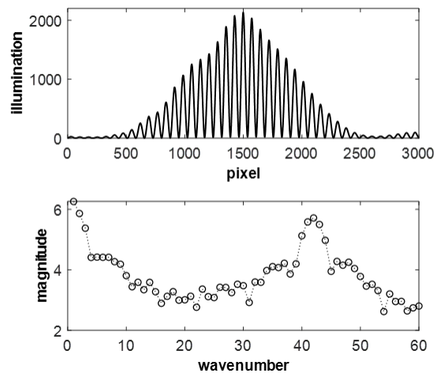

Figure 1

(top) Interference Pattern Averaged Over 2,400 Line Camera Images in One Session (bottom) Mean Log of the Real Component of the Fourier Transform of these Images for Wavenumbers 1 through 60

Figure 2 (top) plots DS power over the course of a typical 11-minute session. Fluctuations in that signal are expected because interferometers are exquisitely sensitive to variations in ambient temperature and vibration. Such variations add noise to the measurements of interest, thus to provide a more stable metric a simple method was devised to transform the raw DS power into the values shown in Figure 2 (bottom).

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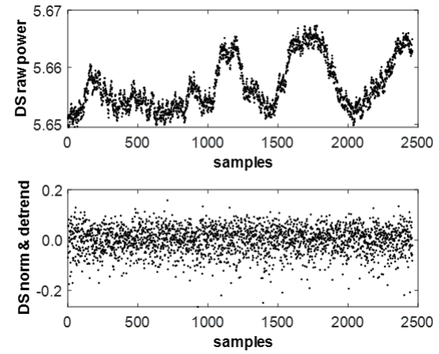

Figure 2

(top): Variations in DS Power over One Session. (bottom): DS Power After Normalizing the Spectrum from Wavenumbers 1 to 60 in each Camera Frame, and then Separately Detrending each of the 60 Wavenumbers

To achieve this transformation, for each frame collected in each session we:

1) Determined the log power spectrum of the interference pattern wavenumbers 1 through 60 (as in Figure 1, bottom).

2) Normalized the spectrum associated with each camera frame using a z-score transform to retain the spectrum's shape without regard to its absolute baseline amplitude.

Then, across all camera frames within each session, we:

3) Calculated the difference between wavenumbers 1 and 42 in each frame. The former is associated with the baseline illumination level, and the latter with the peak DS power. The difference between these two values provides a way to measure changes in DS power with respect to the baseline (call this difference Δ).

4) Linearly detrended Δ to remove potential drifts over the course of each session.

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5) Determined the absolute difference between the variance of all Δ samples in the concentrate condition, versus the variance of all Δ samples in the relax condition (call this value |Δv|).

6) Randomly permuted the order of the Δ values produced in step 4 to form a scrambled array for all human sessions, and separately for all robot sessions (using the Matlab function randperm).

7) Recalculated |Δv| as in step 5, and then repeated this process 1000 times.

8) Calculated $z = (x - \mu)/\sigma$, where x was the original |Δv|, and μ and σ were the mean and standard deviations of the randomly scrambled |Δv| values, respectively.

Now, across sessions, we:

9) Formed an array of the z scores produced in step 8 for all sessions involving human observers (call this array, $z_{|\Delta|H)}$, and then formed a separate array for all sessions involving robots, $z_{|\Delta|R}$).

10) Combined the $z_{|\Delta|H}$ scores as a Stouffer *Z* to form a single score associated with human observers, and the same for the $z_{|\Delta|R}$ scores (Stouffer et al., 1949). This step requires the $_{|\Delta|}$ scores to be independent, which was confirmed as shown in Figure 3.

11) Used a Wilcoxon rank sum test to compare the medians of the distribution of $z_{|\Delta|H}$ versus $z_{|\Delta|R}$ (a *t*-test could have been used, but the nonparametric test is more conservative).

12) Finally, lagged the original attentional condition assignments from 0 to 5 seconds to account for the time it takes to switch attention between two conditions. The optimal time shift was determined empirically for the 2013 dataset, and then the same parameter was used in analyzing the 2014 dataset. The reason that a lag analysis is important is that if the observed effect is really due to shifts in attention, then there should be a lag in the results because the mind cannot "switch gears" instantaneously.

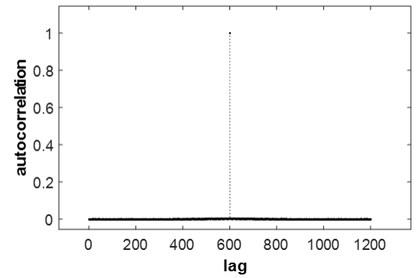

Figure 3

Autocorrelation ± 600 Samples (Matlab function xcorr), Averaged over 500 Sessions, Indicating that the |Δv| Samples Were Independent of each Other

Results

Sessions

Over the calendar year 2013, a total of 4,008 sessions were recorded. Of those, 1,256 were completed by humans and 2,312 by robots, where "completed" means that the data in a session were collected during a full run of 21 alternating attentional epochs. Those sessions were readily identified because the web server marked such sessions as "finished." For the remaining 440 sessions, the server marked the session as "crashed" and were not analyzed. Crashed sessions could happen because the participant quit the web browser before the session ended, or because transmission of data from the optical system to the server was interrupted for unknown reasons.

During 2014, a total of 5,798 sessions were recorded, of which 1,569 were completed human sessions, 3,157 were completed robot sessions, and 1,072 were crashed sessions. Combined over both years there were 2,825 human and 5,469 robot sessions, for a total of

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8,294 sessions. Details about the participants and their locations can be found in an earlier publication (Radin et al., 2016).

Analysis of Variance

Figure 4 shows the results of the Stouffer Z scores associated with human (shown as circles) and robot sessions (shown as diamonds), separately for the 2013 and 2014 data, with lags from 0 to 5 seconds (steps 10 and 12, above). After applying a False Discovery Rate (FDR) adjustment with alpha = .002, the 2013 data resulted in six significant deviations for human sessions (red circles in Figure 3) and no significant deviations for robot sessions. Incidentally, this alpha was selected to help narrow down the most significant outcomes. Otherwise, if a more common alpha of $p<.05$ were used, nearly all of the comparisons would have been considered significant.

The peak deviation in 2013 was at a time lag of 1.25 seconds and was associated with $z = 4.16$, $p = .00002$. The same analysis applied separately to the 2014 data resulted in three significant deviations in human sessions (green dots), and again no significant deviations in robot sessions. The 2014 value at the 2013 peak of 1.25 seconds was associated with $z = 3.14$, $p = .0008$, replicating the 2013 results.

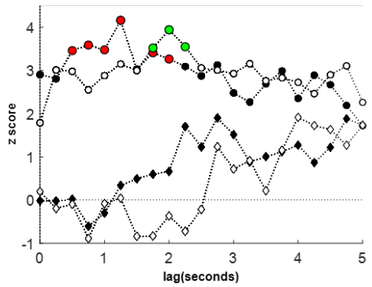

Figure 4

Z Scores for z|Δ| for Human and Robot Sessions (Black Circles and Diamonds, Respectively), Likewise for 2014 Sessions (White Circles and Diamonds)

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We may note here that in our original study the maximum lag was observed at +9 seconds (Radin et al., 2016). Why the maximum lag in this analysis occurred at 1.25 seconds is unknown but it may be related to differences between the original and the present methods of analysis. In addition, previous experiments of this sort conducted in our laboratory found lags of 3 or 4 seconds (e.g., Radin et al., 2012). Establishing why these lag lengths differ with alternative analytical methods requires further study, although notice that even at zero lag the results in the present analysis remain significant (assuming FDR adjustment is not required if one considers only that one comparison).

Figure 5 shows the Wilcoxon rank sum results comparing the medians of the $z|\Delta|_H$ and $z|\Delta|_R$ scores (analysis step 11, above). After FDR adjustment with alpha = .025, the 2013 data (black dots) showed three significant deviations (red dots) with lags ranging from 0.75 to 1.25 seconds. The same analysis applied to the 2014 data (white dots) showed three significant deviations (green dots), with lags from 1.25 to 1.75 seconds. The 2013 peak at 1.25 seconds was associated with $z = 3.21$ ($p = .0007$), and the 2014 peak at the same lag was $z = 2.71$ ($p = .003$).

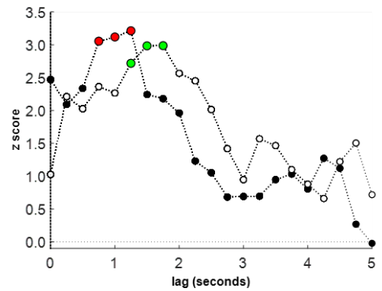

Figure 5

Wilcoxon Comparison of z|Δ| Human vs. Robot Sessions for 2013 Data (Black Dots) and 2014 Data (White Dots)

Figure 6 shows the Stouffer *Z* scores for all human and robot sessions combined across both years. After FDR adjustment at alpha = 10^{-6}, the combined data showed two significant deviations for human sessions (red circles) and no deviations for robot sessions (with the latter more liberally tested with FDR, $p = .05$). The peak value for the human sessions at a lag of 1.5 seconds was $z = 5.57$ ($p = 1.3 \times 10^{-8}$). Figure 7 shows the Wilcoxon rank sum comparison between the human and robot data, indicating three significant deviations with FDR, $p = .002$. The peak value at 1.5 seconds in that case was $z = 3.79$ ($p = .00008$).

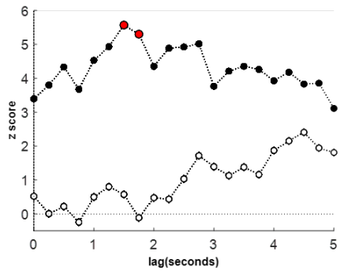

Figure 6

Z Scores for z|Δ| in all Human (Black Circles) and for all Robot (White Circles) Sessions, for all Data Combined Across Two Years

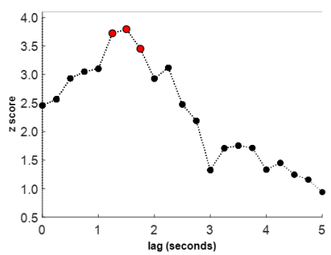

Figure 7

Wilcoxon Comparison of the Medians of z|Δ| for all Human vs. Robot Sessions Across all Data Combined

Time of Day Comparison

Considering all data across both years, Figure 8 compares effect sizes and 95% confidence intervals during the day (6 AM to 6 PM, Pacific Time), when laboratory staff were generally within a few meters of the optical apparatus, versus in the evening (before 6 AM or after 6 PM), when no one was present. The results show similar peak effect sizes at the same lags in both time periods. This argues against the possibility that the results were due to the presence of people in the lab, which may have introduced environmental artifacts like vibration or changes in ambient temperature.

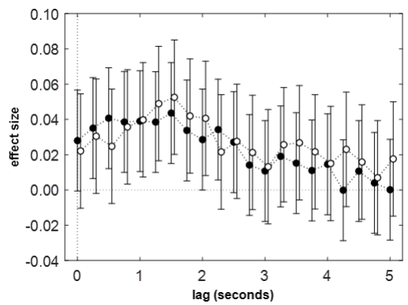

Figure 8

Effect Size ± 95% Confidence Intervals Based on a Wilcoxon Comparison of Medians Between z|Δ| for all Human vs. Robot Data Collected During the Day (White Circles) Versus the Evening (black Circles). The Peak Effects for both Datasets Occurred at a Lag of 1.5 Seconds

Other Environmental Factors

We assumed that the robot sessions were ideal controls to compare against human sessions, and that the use of a detrended, differential metric reduced the possibility that variations in laser power or environmental influences might have given rise to spurious differences between the human and robot sessions. Neither the optical system nor the computer collecting camera data from that system "knew" if data were being served

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to a distant human or a robot, and there were no indications on the apparatus or computer that might have revealed if it was idling or currently serving data. This "silent operation" was by design to prevent laboratory staff from being aware of, and thus inadvertently influencing, the on-going status of the experiment.

To check if these assumptions were correct, we explored if the results might have been due to a correlation between laser power and the z|Δ| metric, or to a non-unform distribution of human and robot sessions. To do this we first examined the mean illumination level recorded by the line camera in each session in chronological order. Figure 9 shows that illumination declined over the course of the two-year experiment. This decline occurred for two reasons: Progressive reduction in laser power output (the laser was powered on continuously for two years), and accumulated misalignments of the laser beam in the apparatus due to ambient vibrations and/or variations in ambient temperature, the latter associated mostly with heating and cooling the lab as the seasons changed.

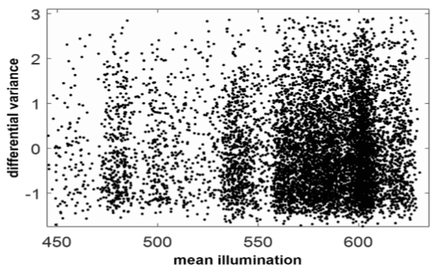

Figure 9

Mean Line Camera Illumination Level (in Arbitrary Units Returned by the Camera Software), Across all Sessions in Chronological Order

Figure 10 shows z|Δ| values obtained in all sessions in chronological order, with human sessions as black circles and robot sessions as red circles. This shows that there were periods when human trials were run with few or no interspersed robot trials. Figure 11 shows that despite the drop in illumination and the nonuniform distribution of human and robot trials, the correlation between z|Δ| (lagged 1.5 seconds) and the illumination level was not significant (r = .015, p = .18).

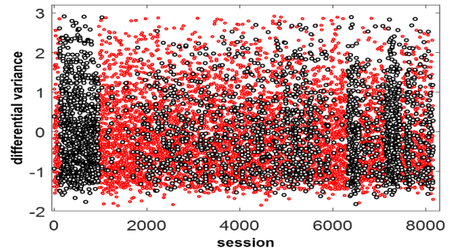

Figure 10

Distribution of all z|Δ| for all Human (Black Dots) and Robot Sessions (Red Dots), in Chronological Order

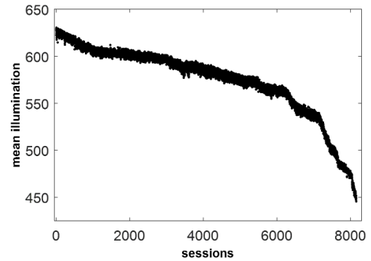

Figure 11

Relation Between Mean Illumination Level and z|Δ|

Although no relation was found between the illumination level or distribution of the type of session, a Kolmogorov-Smirnov comparison of the distributions of human versus robot z|Δ| values resulted in $p = 3 \times 10^{-6}$ (Matlab function kstest2; see Figure 12), and a Wilcoxon rank sum comparison of the medians of those distributions resulted in $p = 3 \times 10^{-5}$. This again showed that the double-slit interference pattern differed when humans were observing the system as compared to when robots were observing.

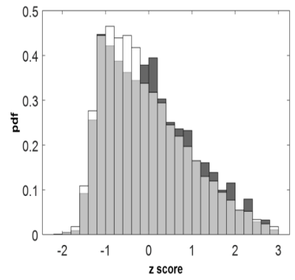

Figure 12

Histogram of z|Δ| for all Human (Black Bars) vs. Robot Sessions (White Bars). Notice the Constrained Variance in the Latter

Discussion

Tremblay's (2021) conclusion after reanalyzing the data from this experiment was: "this particular dataset does not contain evidence of mind-matter interaction…." That conclusion was justified based on the original hypothesis that focused attention would unidirectionally collapse the wavefunction in accordance with the observer's attention and/or intention. Incidentally, it is noteworthy that his conclusion was also extremely conservative because Tremblay's analytical method required Holm-Bonferroni adjustment for hundreds of statistical tests. By contrast, the present analysis only required a few adjustments.

If the original hypothesis were correct then such an effect would be best detected as a shift in the mean of a suitable metric. However, given the results observed in the present analysis, in Guerrer's replication attempt (Guerrer, 2019), and similar variance effects observed in another laboratory experiment we conducted (Radin et al., 2021), we suspected that a unidirectional hypothesis may not be the most sensitive way to detect the hypothesized effect. Instead, because of internal and external distractions (i.e., mind-wandering, phone calls, multitasking, etc.), a more suitable hypothesis may be bidirectional. This may be an especially important consideration when dealing with online participants who are not selected for potential talent, or meditation experience, or other skills that require expertise in maintaining focused attention. It is also possible that even in those who can maintain tightly focused attention than their intentions may unavoidably wax and wane, akin perhaps to punctuated moments or "quanta" of consciousness.

The possibility that assumptions of the statistical tests used in this analysis were violated was avoided by using nonparametric methods, and also by demonstrating that the |Δ| values used to characterize the results in each session were independent of each other. Potential biases due to data selection were avoided by evaluating all completed sessions, and possible biases that might have arisen by adjusting analytical parameters to fit the data were addressed by first developing a method that was applied to the 2013 data, and then applying the same method to the 2014 data.

The primary limitation in this reanalysis is that it is unknown if the same analytical approach could successfully detect results in a similarly designed experiment. Only future replications can answer that question. However, the results so far suggest that revising the original hypothesis from directional to bidirectional reverses Tremblay's conclusion, suggesting instead the presence of a psychophysical interaction effect in an online double-slit experiment.

Data Availability: All data used in this study are available from https://osf.io/ywktp/. Matlab scripts for the analyses presented in this paper are available on request from the first author.

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Psychophysikalische Effekte auf ein Interferenzmuster in einem optischen Doppelspaltsystem: Eine explorative Varianzanalyse

Dean Radin Arnaud Delorme

Zusammenfassung: Zielsetzung: In einem zweijährigen Online-Experiment wurde die Hypothese getestet, dass die fokussierte menschliche Aufmerksamkeit, die abwechselnd auf ein optisches Doppelspaltsystem gerichtet ist oder sich von diesem entfernt, das Interferenzmuster in einer vorhersagbaren, unidirektionalen Weise beeinflussen würde. Als Kontrollbedingung wurde ein Webserver eingesetzt, der periodisch einen menschlichen Beobachter simulierte. Methode: Auf der Grundlage der Ergebnisse einer unabhängigen Reanalyse dieser Daten und der Ergebnisse einer unabhängigen konzeptionellen Replikation haben wir die ursprüngliche Richtungshypothese revidiert, um die Möglichkeit zu prüfen, dass das Herumwandern der Gedanken und andere Ablenkungen die Aufmerksamkeit und die Intention nicht vohersagbar fluktuieren läßt. Dies wiederum könnte dazu geführt haben, dass der hypothetische psychophysische Einfluss eher als bidirektionaler Effekt (d.h. eine Verschiebung der Varianz) denn als unidirektionaler Effekt (eine Verschiebung des Mittelwerts) nachgewiesen werden kann. Methode: Um diese Idee zu testen, entwickelten wir eine varianzbasierte Analyse anhand der Daten, die im ersten Jahr des Experiments erhoben wurden, und wandten sie dann auf die Daten des zweiten Jahres an. Ergebnisse: Die Daten aus dem ersten Jahr zeigten, dass von Menschen durchgeführte Experimentalsitzungen zu signifikanten Varianzunterschieden im Vergleich zu den von einem Computer durchgeführten Kontrollsitzungen führten, z = 4,16, p = ,00002. Die gleiche Analyse für die Daten des zweiten Jahres ergab ein z = 3,14, p = ,0008. Die Untersuchung der Umgebungs- und Gerätevariablen ergab, dass diese Faktoren nicht für die beobachteten Varianzveränderungen verantwortlich waren. Schlussfolgerung: Die Ergebnisse deuten darauf hin, dass eine Varianzanalyse bei Experimenten dieser Art empfindlicher auf psychophysische Effekte reagieren könnte.

Eberhard Bauer

Efeitos Psicofísicos em um Padrão de Interferência em um Sistema Óptico de Fenda Dupla: Uma Análise Exploratória de Variância

Dean Radin Arnaud Delorme

Resumo: Objetivo: Um experimento on-line de dois anos testou a hipótese de que a atenção humana focalizada alternativamente direcionada para um sistema óptico de dupla fenda afetaria o padrão de interferência de forma previsível e unidirecional. Uma condição de controle foi empregada ao ter um servidor web periodicamente simulando um observador humano. Método: Com base nos resultados de uma reanálise independente destes dados e no resultado de uma replicação conceitual independente, revisitamos a hipótese direcional original para explorar a possibilidade de que o vaguear da mente e outras distrações possam ter causado uma oscilação imprevisível da atenção ou da intenção. Isso, por sua vez, poderia ter ocasionado que a influência psicofísica hipotética fosse mais facilmente detectada como um efeito bidirecional (ou seja, uma mudança na variância) do que como um efeito unidirecional (uma mudança na média). Método: Para testar esta ideia, desenvolvemos uma análise baseada em variância usando dados coletados durante o primeiro ano do experimento, e depois a aplicamos aos dados do segundo ano. Resultados: Os dados do primeiro ano mostraram que as sessões experimentais realizadas por humanos resultaram em diferenças significativas de variância em comparação com as sessões de controle realizadas por computador, z = 4,16, p = ,00002. A mesma análise aplicada aos dados do segundo ano resultou em z = 3,14, p = ,0008. O exame das variáveis ambientais e dos aparelhos indicou que esses fatores não eram responsáveis pelas mudanças observadas na variância. Conclusão: Os resultados sugerem que uma análise de variância pode ser mais sensível aos efeitos psicofísicos neste tipo de experimento.

Antônio Lima

Efectos Psicofísicos en un Patrón de Interferencia en un Sistema Óptico de oble rendija: Un Análisis Exploratorio de Varianza

Dean Radin Arnaud Delorme

Resumen: Objetivo: Un experimento en la red de dos años de duración puso a prueba la hipótesis de que la atención humana enfocada, dirigida alternativamente hacia o aparte de un sistema óptico de doble rendija, afecta el patrón de interferencia de forma predecible y unidireccional. Se empleó una condición de control haciendo que un servidor de la red simulara periódicamente a un observador humano. Método: Basándonos en los resultados de un nuevo análisis independiente de estos datos y el resultado de una réplica conceptual independiente, revisamos la hipótesis direccional original para explorar la posibilidad de que el vagabundeo de la mente y otras distracciones pudieran haber causado que la atención o la intención fluctuasen de forma impredecible. Esto, a su vez, podría haber causado que la influencia psicofísica hipotetizada se detectara más fácilmente como un efecto bidireccional (es decir, un cambio en la varianza) en lugar de un efecto unidireccional (un cambio en la media). Método: Para evaluar esta idea, desarrollamos un análisis basado en la varianza utilizando los datos recogidos durante el primer año del experimento y luego aplicamos el mismo método a los datos del segundo año. Resultados: Los datos del primer año mostraron que las sesiones experimentales llevadas a cabo por humanos dieron lugar a diferencias de varianza significativas en comparación con las sesiones de control llevadas a cabo por un ordenador, z = 4.16, p= .00002. El mismo análisis aplicado a los datos del segundo año dio como resultado z = 3,14, p = .0008. Un examen de variables ambientales y del aparato indicó que esos factores no fueron responsables de los cambios observados en la varianza. Conclusión: Los resultados sugieren que un análisis de varianza puede ser más sensible a los efectos psicofísicos en este tipo de experimentos.

Etzel Cardeña

Apparent Past-Life Memories in a Recurring Dream of the 1934 Los Angeles New Year's Flood[1]

James G. Matlock

Parapsychology Foundation

Abstract: As with memories of the present life, memories of apparent previous lives may appear in dreams, sometimes in nightmarish dreams. This paper presents the case study of a dream of a traumatic event (a death) that transpired 36 years before the birth of the dreamer. The dream recurred several times a month from age 4 until the dreamer was in his 20s. The dream invariably caused waking in distress and in a cold sweat and was recalled after waking. These are characteristics of posttraumatic nightmares, although the trauma here would seem to derive from a former life, not the dreamer's present life. The dreamer continues to recall the event in his 50s and is still severely affected by it. Recurring nightmares are common in past-life memory reports, but this case is unusual in that the dream was detailed enough to permit verification of its main elements as well as the identification of the dream protagonist. The event in question was obscure enough, yet the dreamer's recollection precise enough, that it is unlikely that the dreamer or his family could have learned about it before his dreams began. I consider the possibility that the dreamer acquired the information through anomalous cognition but reject it partly for lack of evidence that emotions of this order can be acquired via psi. Although no single case can provide convincing evidence for reincarnation, this case adds to the growing body of research that makes the possibility worthy of serious consideration.

Keywords: autobiographical memory, dreaming, episodic memory, past-life memory, posttraumatic stress disorder, recurring dreams, recurring nightmares, reincarnation

Highlights

- The substance of Scott Perry's recurring nightmare was carefully investigated and found to reflect an accurate memory of an event including a death that occurred 36 years before his birth.
- Scott's recurring nightmare has the characteristics of a replicative posttraumatic nightmare, with the trauma originating not in his present life but in an apparent previous life.
- This unusual case adds a new dimension to the growing evidence for reincarnation from verified reports of past-life memory.

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https://doi.org/10.31156/jaex.23577

Claimed memories of previous lives have received little attention from memory researchers. However, a good number of people have had what they believe to be involuntary memories of past lives, which show many characteristics of involuntary memories of the present life (Matlock, 2019, pp. 127–129). Many are vivid flashbulb memories and, like present-life memories, may be triggered by association with things seen or heard. Many demonstrate recency effects (memories concentrated on the last days, months, and years of the previous life) or reminiscence bumps (memories from the prime years of the previous life). The only type of memory regularly missing from past-life recollections is what Martin Conway (2005) termed "autobiographical knowledge," knowledge of the course of our lives that allows us to place fragmentary autobiographical memories in context when they surface in our conscious awareness (Matlock, 2019).

Autobiographical memories regularly make their way into nighttime dreams, although for the most part they stop short of being fully episodic (Fosse et al., 2003; Malinowski & Horton, 2014). Fosse et al. (2003) estimated that episodic memories of the present life appear in only about 1–2% of dream reports. Episodic memories may appear at a higher rate in recurring dreams, especially in recurring nightmares (Schreuder et al., 1998), although this relation has not been well studied. Recurring nightmares are thought to reveal posttraumatic reactions (Spoormaker, 2008).

Given the strong similarities between past-life and present-life memory, it is not surprising to find episodic past-life memories manifesting in dreams. Dreams with apparent past-life-derived content have been reported by children and adults, albeit with differences. With children they often take the form of nightmares (Mills, 1994; Stevenson, 2001), whereas with adults this is less often so (Matlock, 2019). Recurring dreams with past-life imagery may be experienced first in early childhood, then persist

with no or very slight change through adolescence and into adulthood (Stevenson, 2001, pp. 48–51).

Little attention has been paid to the accuracy of episodic memories in general, much less to those incorporated in dreams. Certain memories are accepted as valid, others dismissed as fantasy, depending on how plausible they seem to the researcher. For example, Akhtar et al. (2018) assume that memories reported from before the second birthday are fictional, simply because the brain is not well enough developed to support encoding before that age. This lack of interest in the veracity of memory claims in mainstream research contrasts markedly with parapsychological studies with spontaneous cases, in which assessing the truth or falsity of reports is the principal concern.

The following case study features a recurring dream memory of the massive flood that hit the Los Angeles area early on New Year's Day, 1934, 36 years before the birth of the dreamer. Details of the memory proved accurate and the dream protagonist was identified, making this a prima facie case of past-life memory. The dreamer has been troubled by the dream throughout his life, conforming to the pattern of posttraumatic nightmares, although no source for such severe trauma is known from his present life. This is consistent with a carryover of consciousness and memory across lives, as is hypothesized to occur with reincarnation (Matlock, 2019).

Because the identification of the previous person (dream protagonist) was made before the case came to my attention, details of the procedures and findings of the investigation follow an account of the flood, the dream, and the steps by which the previous person was identified. I take up the issue of apparent past-life memory influences on dreams and how best to explain them in the Discussion section.

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The Los Angeles New Year's Flood

The San Gabriel Mountains in the northern part of Los Angeles County are cut by numerous canyons. Local historians Art Cobery, Mike Lawler, and Pam Lawler (2012) trace the genesis of the 1934 New Year's Day catastrophe to peculiarities of the region's geology and rainfall patterns. These create a thirty-year cycle of overgrowth, brush fires, and heavy rains over a denuded landscape, resulting in devastating flash floods washing down from the mountains into the valley. By the start of 1934, earlier iterations of this cycle had been forgotten and rural parts of Los Angeles County were being populated by families forced out of urban areas by the Great Depression.

The calamity began to unfold shortly after midnight on New Year's Day, when the San Gabriel Mountains, which normally receive 16 inches of rain annually, were inundated with 8.27 inches in 24 hours. Slopes in at least three locations collapsed under the sudden deluge, sending millions of tons of rocks and mud cascading down the canyons. The plunging debris-laden water departed stream beds and broadened into a scythe of destruction as it descended. The official death toll was only 39, but property damage was extensive: 198 homes were destroyed completely, an additional 401 rendered uninhabitable. Roads, streets, bridges, water pipes, power lines, and other critical systems were ruined. The disaster helped spur much-needed infrastructure improvements that are still in place today.

Scott Perry's Recurring Dream

Scott Perry was born in Troy, Ohio, on March 15, 1970. Following a divorce from his biological father, his mother remarried and when Scott was three and a half the family relocated to Decatur, Illinois. Along the way, they crossed several rivers, upsetting the toddler on each occasion. Shortly after the move to Illinois, Scott began to experience a recurring dream, which he felt to be a memory. He recalled the dream upon waking, but

his parents, especially his step-father, belittled it, and he quickly learned not to talk about it. The dream was made more intense by keeping it to himself, but it did not recede for many years. It would come sometimes several times a month, with little alteration from one time to the next. The following text, from November 6, 2019, emails to Lora Martinolich from the Glendale Public Library and Mike Lawler of the Historical Society of the Crescenta Valley, has been lightly edited to correct errors of capitalization and punctuation, but is otherwise unaltered. It was more heavily edited by Lawler and included in a column he published online in the Crescenta Valley Weekly on April 23, 2020: https://www.crescentavalleyweekly.com/viewpoints/04/23/2020/treasures-valley-supernatural-mystery/. As he described it in November, 2019, emails

> From the age of 3—and I am able to recall further back memories as far as 18 months—I would have recurrent memories and dreams, but always the same one; it never deviated. My memories always started with my mother coming in, waking me up saying we have to go now! I am wearing a white, light lace nightgown. I occasionally see blonde hair that gets into my face. She grabs me and picks me up; I am half asleep. We run out of the house; my mother tells us to get in the car, which is a 1930s style sedan; I always knew that part. My father gets in the driver's seat and a boy and a girl are already in the car. I know them but don't know who they are. I remember the boy was dressed in blue denim overalls with a white shirt with light stripes on it up and down, a crosshatch type pattern. His shoes were worn, leather soles laced mid ankle, shoes like a work lace up type shoe, but really worn. The girl was similar in age but I could see she was frightened and she tells me it's going to OK. She is wearing a white lace dress with light flower design on it, leather buckle type shoes with white lace socks, not shiny but worn. I can make out the back window very well too. The back seat is not close like today's cars are, but about 2 feet or so farther back, plenty of room for them.

> My mother puts me in the middle seat as she gets in the car, then she holds me in her lap. She shifts me to her left shoulder and I am looking over her left shoulder. She yells at my father we need to go faster and he replies the car won't go any faster. My mother is in a near panic state. She has a white or light yellow dress on, I think an old style apron too, worn not new. My father has tan pleated pants on with worn brown leather shoes, not work boots. He has suspenders on and a white long sleeve shirt and a tan, with a black striped band on the hat, 1930's style. I can remember every hard bump the car makes, suspension is almost non-existent compared to today; the whole car feels like an air of panic has set in. I look at the boy and girl and they are scared. I look out the back window and I see a wall of dirty, muddy water like a tidal wave coming at us. I get scared; my mother turns and sees it and yells again to my father to go faster and the car is hit by the water, jarring us good, pushing the car too. The back window is blown out. Water pours in over the boy and girl amid their screams and water spills in the car and then comes in the passenger side and driver side windows.
>
> The shock and force of the water rip me from my mother's arms out the passenger side window and I'm swept outside the car. I vaguely recall mother screaming, trying to hold on to me, arm outstretched, losing grip on my arm. The water takes me under. I can't breathe. (By this point in this life, I am panting and sweating cold sweat! and starting to wake up each and every time. It happens every single time like [this]; I wake up drenched cold and clammy.) I remember drowning, water filling my lungs, but it was very peaceful, not panicked, calming almost. I leave my body and at the top of the water I can see a ball of light shining thru the dark water, pulling me towards it. There is one memory that's hazier though and it only happens occasionally, not every time. As the light takes me up, I see houses with muddy water up to the roof line and trees with water high up them, and it's like you're

speeding past them all very fast and speeding up like you're fast-forwarding a movie, and that's it, that's all I recall.

Identifying the Dream Protagonist

Not only did this dream recur frequently, it was more realistic in visuals and emotion than Scott's regular dreams. Moreover, it did not fade upon waking, as his regular dreams did. He felt intuitively that it depicted a real event, although his family would not accept this.

Scott knew of no similar experiences until April 2004, when he saw an ABC Primetime Thursday documentary about James Leininger. When young, James too suffered from a recurring nightmare, although in addition he had waking memories that allowed the person whose life he recalled to be traced (Leininger et al., 2009; Matlock, 2022; Tucker, 2016. Sudduth, 2021, questioned the legitimacy of the James Leininger case. His arguments were countered by Tucker, 2022, and Matlock, 2022; Sudduth, 2022, responded to Tucker, 2022).

Scott had heard of occasional flooding in southern states such as Florida, Alabama, and Mississippi, and assumed that the disaster had transpired in that region. From time to time, he tried to identify it, but never came across an incident that even approximated his dream. This changed when he happened to watch an episode of Hollywood Graveyard that had been posted to YouTube in April 2018. The show explored Los Angeles's Woodlawn Cemetery, where among other film stars are buried twin actors Winston and Weston Doty, victims of the 1934 New Year's flood. When he looked up the Doty Twins, Scott discovered they were from Montrose, California.

Scott felt a strong reaction to the name "Montrose," for reasons he could not comprehend, but realized it must hold special significance for him. He went to his computer and searched the Internet for "family of five died in car flood New Year's Day Montrose California." At the right of the results page was the photograph of what appeared to be a Ford Model B sedan overturned in a trench. The first item in the results list was an article that had been posted on the Internet two years prior. Entitled "15 Striking Photos of the 1934 New Year's Floods in Los Angeles," it presented photographs from the Los Angeles Times in the first days of January 1934. The text began, "In November 1933, wildfires raged through the nearby San Gabriel mountains above the Los Angeles County communities of La Crescenta, La Cañada and Montrose." The caption on the photo of the overturned car read: "Jan. 1, 1934: Five people drowned when this car and Rush Avenue bridge was swept into the Alhambra Wash, near present day Whittier Narrows Recreation Area." The photograph is reproduced as Figure 1.

Figure 1

Car Overturned in Alhambra Wash, Jan. 1, 1934 (Los Angeles Times, Jan. 2, 1934)

Scott felt instinctively that this was the car of his dream. The style of car and five deceased matched his memory and he set about determining who these individuals were. News stories from January 2 and 3, 1934, led him to think that in the front seat were John and Elizabeth Moore and their daughter, June. Early news stories mistakenly gave June's name as Martha, but this was corrected by the time of the family's interment in Roosevelt Memorial Park in Gardena, California, on January 5. On the Find a Grave website, Scott discovered their virtual headstones. The daughter's name appears there as June Edna Moore, and her dates as 1927–1934. He added a "flower" on November 2, 2019:

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"June, me and you have come full circle now, I finally found you after all these years. One life leading me to the next and you were bravest little girl. Thank you for this journey and rest in peace."

Scott determined that the passengers in the back seat were a brother and sister, Sherman and Ethel Mae "Toots" Hubbard, with whom the Moores had been celebrating New Year's Eve, and on November 6 reached out to Lora Martinolich in hopes of learning more about the Moore family and their deaths. He first called Martinolich and Lawler, then followed up with emails in which he described his recurring dream and identified June Moore as his previous incarnation. He said he hoped that by looking further into the matter, he might obtain relief from the enduring trauma of his memories. James Leininger, he noted, had been much helped by having his memories verified and going back to the place in which he recalled having died.

As Jay Holladay of the Historical Society of the Crescenta Valley and other researchers became involved, the story of that night came into better focus. John Moore, it emerged, was a bus driver, and so enjoyed steady employment in those difficult years. He was 40 years old at his death; June's mother Elizabeth was 44. They had spent New Year's Eve celebrating 21-year-old Sherman Hubbard's honorable discharge from the Marine Corps. With them were Sherman's 23-year-old sister Ethel and John's maternal uncle, Earl Greer Denniston. They had been with the Hubbard siblings' mother and step-father, Bertha and Luther McCasland, in Wilmington, not far from Long Beach, and were returning to the Moore residence in Rosemead. They were planning to attend the Rose Parade on New Year's Day, but did not make it.

The five were among the few fatalities that night outside the Crescenta Valley. Alhambra Wash is one of several streams running out of the San Gabriel Mountains to the east of the valley. Flows from the Crescenta Valley lead to the Verdugo Wash, a tributary of the Los Angeles River, whereas the Alhambra and other washes to the east join the Rio Hondo. These latter streams carried debris flows similar to those in the streams leading into the Crescenta Valley, but because their headwaters area had not been subject to the same intense burn-off, the flows remained canalized rather than overtopping banks and fanning out over land.

Although some contemporary news stories stated that the Moores' car went into the Rubio Wash rather than the Alhambra, a photograph of the destroyed bridge published in Los Angeles Times on January 5, 1934 (Figure 2), makes clear that it was the latter. The Moore's car was recovered at some unstated distance downstream from the bridge. By some accounts, the bodies were found yet further downstream, June apart from the rest.

Figure 2

Site of Destroyed Alhambra Wash Bridge (Los Angeles Times, Jan. 5, 1934)

If they were returning from Wilmington, the Moores and Hubbards would have crossed the bridge from east to west, intending to turn at San Gabriel Boulevard to reach the Moore residence at 3106 South San Gabriel Boulevard (Figure 3 shows a Google Map of the area in 2022). The debris flow would have hit the car from the right, demolishing the bridge and sending the car tumbling down the wash. If they were near the end of the bridge at the time, June and her mother, looking out of the back window, would have seen the flow coming before the others did, owing to the bend in the channel. The waves of debris that passed through the Crescenta Valley are estimated to have been 20 feet tall; although those coming down the Alhambra Wash must have been much smaller, they

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likely were of considerable height, consistent with Scott's dream of being overtaken by a brown tsunami.

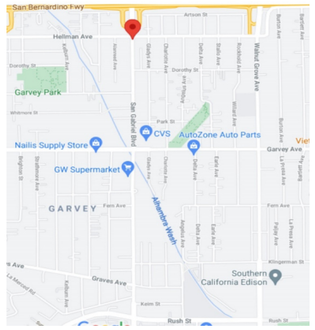

Figure 3

Rosemead, California, in March 2022, per Google Maps

Most contemporary news accounts give June's age as 7, although a few list it as 6. According to the 1930 federal census, she was born "circa 1928," which would indicate that she was most likely 6. Her death certificate (posted on the Find a Grave website) gives her date of birth as June 17, 1927, so she would have been 6.5 years old, aligning with Scott's impression of a young girl. If his memory of being sucked out of the window is correct, June would not have witnessed the fate of her parents and the Hubbard siblings.

A significant element of the story was not known initially, but soon emerged. There had been a sixth passenger that night, Earl Denniston, who hopped into the rumble seat at the rear of the car before it pulled away from the McCasland house. His position meant that when the car tumbled into the wash, he was tossed into the water. Somehow he managed to pull himself to shore. The testimony he provided reporters furnishes much of what is known about the tragedy (see in particular, "Five Drown in Plunge Off Bridge," Rosemead Review, January 5, 1934).

Bertha McCasland died in Los Angeles in 1948, Earl Denniston in San Diego in 1972. His son, Earl Wayne Denniston, born in 1940, died there in 2006. Had Scott been able to communicate the place June died when he started having his dreams, he might have been able to contact relatives of the Moore and Hubbard families. By the time he made the connection, all those who knew June and her parents, as well as most of their first generation descendants, had passed away. Through genealogical research, Jay Holladay managed to trace one, however. He was Bruce Hubbard, whose father was a cousin of the Hubbard siblings. Bruce emailed Scott a photograph of Ethel, which overwhelmed him when he saw it. "Seeing Toots' eyes the other day really shook me to my core! I still remember the look of fear she gave me as the water hit the car! It's one of the things I could never forget about this." He added that he was hoping they would find a picture of June and her family "and if I can get out there and see where it all happened it may finally bring me peace."

Case Investigation

Initial Phase

Scott's case came to my attention through the Signs of Reincarnation Facebook group and an episode of Marilyn Elliott's podcast, Reincarnation – Past Lives Revisited, posted to the Internet on August 20, 2020. I made contact with Scott and expressed interest in studying his case. From the start, he has been cooperative, freely supplying materials and sharing his email exchanges with Mike Lawler, Jay Holladay and others. He has never requested or expressed the expectation of compensation of any kind.

Because the case had already been solved (the dream protagonist identified), my first task was to document the dream and the process of identification, then to confirm that the identification was warranted. I did this by going over the materials furnished me, following up hyperlinks, and repeating research that had been done on findagrave.com, in the 1930 census, in genealogical records, and on other sites. I satisfied myself that the story had been properly represented and found nothing to suppose that Scott was not

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justified in identifying himself with June Moore. His long search for the source of his memories suggested that the circumstances of June's death were likely a unique event and the correspondences between the dream and reality were striking.

There remained the possibility that Scott had somehow learned of the tragedy and incorporated that into his dream, and I wanted to obtain a more comprehensive understanding of his experience and its effects on him. From what I gathered, his dream had all the hallmarks of a replicative posttraumatic nightmare—it replayed an actual event, was repetitive, invariably led to waking in distress, and was recalled after waking (Levin & Nielsen, 2007; Spoormaker, 2008). Such nightmares may recur for years, even decades (Schreuder et al., 2000). In the clinical literature, they are associated primarily with battlefield experiences or sexual abuse from earlier in the dreamer's life. For Scott, the traumatic event seemingly transpired in a different life. I wondered if his dream might be a psi-derived screen memory masking a repressed trauma from the first years of his own life; there were some steps to go before I would feel confident positing a past-life origin.

Progression of Distress Symptoms

I met Scott in Decatur, Illinois, on the evening of August 22, 2021, and went over the history of his experiences with him. I learned that tests he had completed in grade school had shown him to have an unusually strong memory. When I interviewed his mother, she acknowledged the strength of Scott's memory, in contrast to her own.

Scott began displaying signs of distress even before leaving Ohio as a toddler. In one of his earliest memories, he managed to climb out of his crib and was discovered beneath it, huddled against a wall. He recalls chewing on an extension cord there, something he says his mother confirmed that he did. Scott recalls climbing out of his crib repeatedly during this period. His mother would awake with the feeling that something was amiss, go into his room, and find him on the floor under the bed. Scott persisted in the habit of hiding under his bed until he was 11 years old, when he grew too big to manage it. He felt safe in this confined space, although he cannot say why. He experienced no imaged memories and is aware of no conscious intent connected with this behavior.

On the drive from Troy, Ohio, to Decatur, Illinois, 3-year-old Scott was fearful whenever they approached a bridge and was disturbed by the thud, thud sound and feeling of the car driving across it. This emotional reaction was not accompanied by conscious impressions or imaged memories. Not long after arriving in Decatur, however, he began to have repetitive dreams in which he saw, from an observer perspective, a young child he identified as himself lying asleep on a Victorian loveseat. A woman he knew to be his mother entered the room and jostled the child awake, at which point the dream shifted to a field perspective and he started experiencing things through the child's eyes. The child's mother said with a sense of urgency that it was time to leave. There was a feeling of panic, a sensation Scott believes was new for him at the time. They departed the house, leaving a heavy-set woman behind a banging screen door. The mother carried the child to a black 1930s Ford sedan and the dream ended, without Scott waking.

When he was 4, Scott began to experience the longer version of his dream, culminating in the child's drowning. He would awaken in a cold sweat, crying. On the first occasion, he got out of bed and his parents found him on the floor, hugging a footpost, "trying to hold on for dear life." He was screaming, "I died! I died!" His mother picked him up, endeavoring to soothe him. His step-father entered the room behind her, "madder than hell." Scott was told that he had had a bad dream and that he should forget it, but the dream repeated a few weeks later and then a few weeks after that. It had a different quality than his regular dreams. Scott felt sure it was a memory, although no one in his family would give credence to that possibility. His mother thought that perhaps he was

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being possessed by the child's spirit, but would not countenance the idea of reincarnation and past-life memory.

When Scott was 7, the pastor of the family's Lutheran church read a sermon about how when one died one went to heaven or hell. This irritated Scott, who blurted out, "That's not right!" His step-father tried to quiet him, but he continued: "That's not right, when you die, you have the choice whether or not to come back." This outburst so enraged his step-father that Scott for many years thereafter did not speak of his dream to anyone, in or out of the home. On the first day of school when he was 13 and in the seventh grade, a teacher held him back and informed him that he had "an old soul." Gazing into her eyes, he responded, "You have no idea how old," but did not elaborate. He has since tried to track down this teacher to tell her his story, but has not been able to locate her again.

Scott left home when he completed high school. He had come to realize that he was a girl in his memories, rather than a boy, as he had assumed from early childhood. His nightmares continued to bother him multiple times a month, but when he was 18, they started to come less frequently. Around the same time, he began to experience strange episodes of anxiety and depression that in his early 20s were recognized by the family to have a genetic basis. His maternal grandfather, mother. and maternal uncle suffer from a similar condition. Although genetic factors are known to be involved in major depression (Shadrina et al., 2018), familial depression may also be a product of the rearing environment (Johnson et al., 2001; Kendler et al., 2020), so Scott's depression may have a complex etiology. Scott has not had a recurrence of his nightmares since he was 25. However, by this time the narrative was fully established in his waking awareness; he claims to have "total recall" of the events and is troubled by them to this day.

Scott recounted to me some details not included in his email account. He recalls seeing dust flying up from the dirt road, so he is sure it was not raining that night, and indeed, according to the Los Angeles Times, the rain was confined to the San Gabriel Mountains and Crescenta Valley; it did not enter the lower Los Angeles basin. The moon was full, providing some light. Scott remembers the car on the wooden bridge and seeing its white-painted guardrails, albeit fleetingly. Part of the trauma is a sense of abandonment when June's mother loses her grip on her arm. Although Scott recognizes that June's mother would have done her best to hold on to her, still he feels this loss keenly. He has the sensation of being hit by sticks as June was pulled under the water, before her consciousness left her body.

Scott never had a fear of water as such, something his mother was unable to comprehend, assuming his dream represented a genuine memory. He did however have a phobia of dark, murky water, and whenever his family went swimming in a lake near their home, refused to enter the water past his knees. It was the same with the ocean, although not swimming pools. He continues to feel fearful approaching bridges but has no other reactions that can be related to June's death.

Scott never displayed gender-nonconforming behavior or experienced gender dysphoria, common in reincarnation cases with a change of sex between lives (Pehlivanova et al., 2018), perhaps because June was young when she died. Such responses appear less often when deaths occur before sexual maturity or in old age (Stevenson, 2001, p. 124).

Although I probed for it, I could not identify an event in Scott's earliest years that might account for his nightmares. His mother's first marriage was difficult; Scott's father was often absent during that period. I could understand how this might have contributed to the stress reflected in his climbing out of his crib and seeking comfort beneath it, but such a trauma did not seem sufficient to explain his nightmares, which began after the move to Illinois. Scott's step-father was emotionally and sometimes physically abusive, but the worst of this occurred after the onset of his dreams. Scott had a mild phobic reaction to the bridges the family crossed on the way to Illinois and it seems possible that

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the bridges acted as a reminder of June's death and precipitated an incubation process that led to his first dream memories, then at age 4, to the full dream sequence. This delayed reaction is consistent with posttraumatic stress, which often compromises memory retrieval (Samuelson, 2011).

Steps Toward Validation

It was many years before Scott began to receive validation for what from age 4 he felt were memories of a previous life. From 1999 to 2003, he lived with his sister and her family. Scott's nephew became interested in reincarnation through reading and his mother suggested he ask Scott about his memories. This surprised Scott because he could not recall having discussed his memories with his sister previously, but since she was five years his senior, she could have observed his tearful awakening at age 4 and heard his assertion that he had died. Scott related his dream, the first time he can recall having described it in full to anyone, feeling relief that finally he was able to do so, and for some months he and his nephew had many discussions about it.

At his sister's suggestion he try to substantiate his dream online, Scott went to his computer and entered various terms into the AOL search engine bar, but nothing of relevance came up. He could find no information about a family of five who had died in a car in a flood. Although Scott attempted other searches later, he was unsuccessful until he saw the episode of Hollywood Graveyard on YouTube in February 2019. The mention of the Los Angeles New Year's Flood led to his locating the photograph of the Moores' overturned car and unravelling the story of what befell them. Scott had been in counseling for anxiety and depression for some years, but had not told his therapists about his recurring nightmare. He now shared it for the first time, explaining the confirmation he had just discovered. Initially skeptical of a reincarnation interpretation, over the next few weeks his therapist came around and encouraged him to persevere in his efforts to get at the source of his trauma.

As he became more confident that his dream would be taken seriously, Scott sought out reincarnation groups on Facebook. One of those he joined was Signs of Reincarnation. He commented there on June 30, 2019, in what appears to be the first public statement of his experience: "Since I was 3 having the same dream 2 to 4 times a month and it was the same thing every time and always ending up with my waking up in a cold sweat. . . . Never felt like dreams, more like memories, you can tell the difference, finally around my early 20's they stopped."

By the start of November 2019, Scott had managed to identify June Moore as his previous incarnation and left his flower by her headstone on the Find a Grave site. A few days later, he made contact with Mike Lawler and Lora Martinolich and the pace of verification accelerated. The story had very largely been pieced together by the time Scott spoke to Marilyn Elliott for her podcast, posted to the web in August 2020. My going over the documentation carefully in the summer of 2021 increased Scott's confidence in the identification of June as his previous incarnation, but at the time of our interview he had not made peace with his apparent memories.

Although he had not been troubled by his nightmares for two and half decades, Scott still recalled their substance clearly, still remembered waking from them, and still felt traumatized by them. In a follow-up telephone interview, he told me that flashes of June's death continue to enter his awareness 20 to 30 times per day. Even when not consciously aware of the images, he senses the scenes replaying like a film in the back of his mind. It is something he does not know how to get away from but has learned to live with, although he feels that the memories have adversely affected every department of his life. He continues to think that perhaps if he went back to the Rush Avenue bridge and

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visited the cemetery where June is buried, he might at last achieve closure, but so much has changed in the interim he is not sure that even that would suffice. He is much concerned that he might himself die and June's story be lost with him. His therapist told him that it was her impression that he was dealing with PTSD stemming from both his present and previous lives; that certainly is one way of understanding Scott's situation, perhaps the most satisfactory one.

Happy Memories of June Moore

Scott has two additional recurring dreams of a young girl he presumes is June, with a more positive emotional valence than his traumatic recollection of her death. He began to have these dreams when he was about 5 years old, the year after he first experienced his nightmare to its conclusion. Although there is no way to assess their accuracy, both dreams have the quality of memories as opposed to creative fantasies. Both are perceived through June's eyes, a field perspective. Neither is as common as the dreams of her death. As is true of many reported dreams with apparent past-life content, they were clearer than regular dreams and were recalled upon waking.

In one of the dreams, June is wearing a white, sleeveless dress with a deep cut, holding a Raggedy Ann doll she adores. She is sitting on the second step leading to the door to their house, watching her mother hang clothes on a line. It is early on a summer evening and there is a breeze in the air. June's mother has her hair tied up in a bun in back and pulled tight in front, but a strand comes loose and the wind blows it into her eye. She takes hold of the strand and tucks it back in, smiling at June. Scott has the feeling that he is an only child and is much loved.

In the other dream, June's mother takes her into a drug store to make a purchase. Scott has the feeling that they have been there before and that they have a close acquaintance with a man, whom he understands to be the proprietor, and his wife. June tugs at her mother's sleeve and asks if she may have a piece of candy. The man says, "You want a piece of candy?" and leads her to another counter where there are large glass jars with metal lids, full of confections. He directs her attention to a separate metal stand, a few feet high, and says, "I just got this in. Have you ever had a Hershey bar?" June has no idea what a Hershey bar is. She selects a large bar and the man smiles at her, saying she has made a good choice. She returns to her mother and asks if she may eat it then. Her mother says teasingly, "I don't know," asks if she might have a piece, and the memory abruptly ends.

The Problem of Corroboration

Scott is well aware of the need to have his recollections confirmed by others. His step-father is now deceased, but he put me in touch with his mother, with whom I spoke on the telephone. Although she said nothing to cast doubt on Scott's memories, she stated that she had retained no memories of her own regarding any of the matters I inquired about. She referred me to Scott's sister, who she said, remembered some things, but despite her and Scott's efforts to arrange an interview with the sister, she has not been receptive to this. Scott tried to put me in touch with his therapist, but even though he could supply a written release she fell back on client privilege and declined to speak with me.

Scott's nephew has been more forthcoming. He confirms that during the period that Scott was living with his family he became interested in reincarnation. "I asked my mom some questions and she told me to talk to Scott." Scott then told him "about driving in the car and a wave of water washing it away and seeing himself as a girl in a dress. He's always had good attention to detail in that matter. He always talked about having the same dream over and over." No one else in the family believed Scott was recalling a past life. The nephew, now in his 30s, is too young to have direct knowledge of the conditions of Scott's upbringing and so cannot vouch for what Scott told me about his early years,

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but he believes that Scott's struggles to make sense of his experiences played into his anxiety and depression. Finally learning about June Moore has brought understanding and helped improve his emotional state to a fair degree:

> I would say the effects of him finding truth to his dreams has affected him in a positive way. He went from being confused not understanding what he was seeing to finally shedding some light on the truth after all these years. Before he found the information about it I feel like he was struggling to make since [sic] of it all which could of course cause anxiety depression and the overwhelming feeling of finding your place in life.

Mike Lawler and Marilyn Elliott, both of whom have had close contact with Scott, share my assessment of the case, but both also became involved after Scott had made the connection to June. Although I have gone back over Scott's research and confirmed it, he was the one to make the identification. With this acknowledgement, it must be said that Scott's narrative has been consistent from the start. He has described the same events repeatedly, to different people, in different contexts, and the outline of his story is confirmed by his nephew. Scott has favorably impressed Mike Lawler, Marion Elliott, and me as being forthright and candid. With no reason to doubt it, I think we may accept his account at face value, even in the absence of more extensive corroboration.

Discussion

It would seem that Scott's dreams are accurate in the details that can be verified and, where they are unverifiable, they are consistent with established facts. How can his dreams be understood, if not as manifestations of past-life memory?

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Subjective Illusion of Significance

The first possibility to consider is that Scott's identification with June Moore and the Los Angeles New Year's flood is due to what Leonard Angel (2015) called the "subjective illusion of significance." How many similar groups of five people died in a 1930s sedan during a flood? Scott was unable to locate any, but he might have missed some in his desultory searching.

Estimations of the likelihood that Scott's memories fit June Moore by chance are themselves bound to be subjective, but those who prefer this interpretation must explain what caused Scott to develop his recurring dreams and associated reactions. Assertions of an unreported trauma from the present life are unsatisfying without substantiation. Scott might have been disturbed by his birth parents' marital difficulties and separation or by his troubled relationship with his step-father, but it is unclear why either would have resulted in his nightmares beginning at age 4.

Imposition of Identity

If the correspondences between Scott's dream and the Moore tragedy are not coincidental, Scott could have learned about the tragedy and incorporated it in his dreams. A family member might have been aware of the story, conveyed this knowledge to Scott, and without realizing it, encouraged him to identify with June. Jay Holladay wondered whether there were genealogical connections between Scott's family and the Moore or Hubbard families that would support such a scenario, but was unable to find any.

As far as Scott knows, no one in his family or social circle had heard of the 1934 flood before he learned about it from Hollywood Graveyard. Woody Guthrie commemorated the tragedy in a 1962 song (https://www.woodyguthrie.org/Lyrics/Los_Angeles_New_Years_Flood.htm). Scott cannot recall anyone talking about this

song, but even had his family been familiar with it, it is hard to see how it could have been a model for Scott's nightmare, because the event it depicts is distinctly different from the Crescenta Valley flood the song describes. Rosemead, where the Moore house was, is 16.6 miles from Montrose, the epicenter of the devastation; Wilmington, whence the Moores left that night, is 32 miles from Montrose on today's roads. The Moore tragedy was a side issue to what happened in the Crescenta Valley so obscure that Mike Lawler believes it would not have been known outside the Los Angeles area at the time. Moreover, Scott's family was so opposed to the idea of reincarnation it is difficult to understand why they would have suggested or imposed a past-life identity on him, even unconsciously.

Living Agent Superpsi

Could Scott have acquired information about the Moore tragedy via anomalous cognition, absorbed it, identified with it, and dramatized it in his nightmares? Several philosophers (e.g., Almeder, 1992; Griffin, 1997; Lund, 2009; Paterson, 1995) have rejected this explanation of apparent past-life memory as implausible because they do not see how even the most extensive psi of the contours presented in spontaneous cases and established in laboratory tests could account for the range of behavioral, emotional, and physical features involved in reincarnation cases. Griffin (1997) considered a theory of retrocognitive psi he called "retroprehensive inclusion" that would permit the retrieval of behaviors and emotions, as well as episodic memories, from a person premortem, but ultimately rejected this idea because, like other forms of superpsi, it would allow past-life information to be accessed by multiple people, an outcome not attested in the reincarnation case literature (1997, p. 205). Greyson (2021, wrote that there are cases of this sort, but this apparently is due to a misunderstanding. All multiple identifications are based on dreams and perceived behavioral or physical traits alone; none include multiple people remembering the same past life, see Matlock, 2019, pp. 266-267.)

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The principal promoters of the psi-acquisition interpretation of apparent past-life memory are Stephen Braude (e.g., 2003) and Michael Sudduth (e.g., 2019). Braude recognizes no limits to living agent psi or superpsi, which he believes could be employed unconsciously like a "magic wand" to achieve any effect, no matter how extreme. Braude is not troubled by the unfalsifiability of this notion, because, he says, "we frequently find ourselves weighing rival, but strictly unfalsifiable, hypotheses" (Braude, 2016). But credibility issues remain. How realistic is it to imagine that Scott for unknown reasons reached out to some source or sources for information about June and her family and mobilized this in his dreams?

Braude (1995, 2003) makes much of the psi-conducive nature of dissociative states, urging this as evidence for the psi-basis of apparent past-life memory. Although identification with a deceased person may be regarded as ipso facto dissociative, dissociative episodes related to past-life recall in children are rare (Matlock, 2019, p. 207). However, Sri Lankan children with past-life memories score high on dissociation scales, perhaps thanks to the unusually high incidence of memories of violent death in Sri Lanka (Haraldsson et al., 2000), and dissociation is a factor in the past-life memories of adults (Matlock, 2019, pp. 207–208, 211–213). It would seem unwise to attribute apparent past-life memory to psi simply because dissociative states are psi-conducive. Dissociative states and the capacity to dissociate have been linked to PTSD (Schiavone et al., 2018) and to nightmares (Maraldi, 2018; Watson, 2001), factors in Scott's case, and it could be that dissociative tendencies helped memories of June rise into his conscious awareness.

Reincarnation and Past-Life Memory

One of the biggest obstacles to the acceptance of reincarnation and past-life memory is the absence of an adequate theory to explain them. In Signs of Reincarnation (Matlock, 2019), I proposed that that what survives death is a stream of consciousness, or conscious experience, continuous with embodied life. I conceive of consciousness as

duplex, including a subconscious stratum along with conscious awareness. The subconscious, I hypothesize, is the repository of memories, emotions, personality traits, behavioral dispositions and other facets of personal identity. A person's consciousness stream persists intact through death until it possesses a new body in reincarnation. Memories of previous lives are retained in the subconscious mind after reincarnation, and from the subconscious may rise into conscious awareness or influence the newly embodied person behaviorally.

My model accounts for Scott's experience in a straightforward manner and in that respect has an advantage over living agent superpsi, which often must presume the integration of disparate types of information from multiple sources, combined with psychokinetic actions. For many skeptics, survival and reincarnation are ruled out by commitment to a materialist philosophy, but that philosophy is being challenged on various fronts and its hold on Western science appears to weakening (Kelly et al., 2015; Kelly & Marshall, 2021). The same thinkers who have objected to superpsi have questioned the physicalist assumption that consciousness is produced by the brain and are open to dualist (Almeder, Lund, Paterson) or idealist (Griffin) alternatives that view consciousness as independent of the brain, yet interactive with it. Griffin (1997) came down in favor of a process metaphysics conception of survival and reincarnation similar to my (Matlock, 2019) processual soul theory.

Nightmares and Past-Life Memory

In *Signs of Reincarnation* (Matlock, 2019, pp. 135–136) I observed that while past-life memory is very similar to present-life memory, it bears little resemblance to anomalous cognition. Past-life memory is personal and limited in perspective, whereas psi spreads its net widely. Moreover, percipients do not confuse psi-acquired information with memory. This suggests that it might be helpful to examine Scott's nightmare within theoretical frameworks developed for the study and treatment of replicative nightmares with references to present-life experience.

Levin and Nielsen (2007) and Spoormaker (2008) outline cognitive-behavioral approaches to nightmares. Levin and Nielsen note that in general nightmares are most common in the young, their severity and frequency declining with age. Posttraumatic nightmares, which follow a particularly distressful event, are an exception. Replicative posttraumatic nightmares carry the heaviest affect load and tend to be the most repetitive, because awakening prevents the subconscious psyche from processing the trauma, which is thus perpetuated. Spoormaker emphasizes that nightmares tend to follow a script and, similarly, suggests that the best way to treat them is to alter the script to assist the integration of the traumatic event with autobiographical memory at the conscious level. Terr (2003) observed this process in children's posttraumatic play and art, similar to what is reported with James Leininger (Matlock, 2022).

The replicative nightmare script is not necessarily a fully accurate replaying of events (Levin & Nielsen, 2007, pp. 500–501; Spoormaker, 2008, p. 16). In a questionnaire study with an instrument devised for the purpose (although without an attempt to verify memories directly), Esposito et al. (1999) discovered distortions in 79% of Vietnam veterans' posttraumatic nightmares. Moreover, the nightmare script may vary slightly from one occurrence to the next (Spoormaker, 2008, p. 16). It is therefore not surprising to hear Scott report minor variations in his dream, despite consistency in its overall trend. Nor is it surprising that in certain respects, Scott's dream appears not to be a faithful reproduction of the Moores' experience.

Despite key details that match reality (the type of car involved, the character of its occupants, being hit by a wall of muddy water), other elements of the nightmare are more dream-like. The most obvious is the time compression. The McCasland house was more than a half hour drive from the Moore house, but the dream presents the tragedy as

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coming soon after the Moores left the McCaslands. The tense atmosphere Scott describes also is suspect. I doubt that the Moores knew what was happening in the Crescenta Valley at the time (in 1934 there was not the 24-hour news coverage we enjoy today) and since it was not raining in their immediate area, they would have had no reason for concern. I think the nightmare's emotional tone is most likely a projection of the panicked final seconds back over the entire event; perhaps, however, as Mike Lawler (personal communication, August 9, 2021) has observed, there was a sense of urgency to get home for a few hours' sleep before leaving for the Rose Parade, and this was misinterpreted by June.

Nightmares with past-life scripts have received little attention from researchers (exceptions are Mills, 1994, and Stevenson, 2001, pp. 49–52). However, judging by the number of reports of such experiences in the Signs of Reincarnation Facebook group and elsewhere on social media, they are a good deal more common than generally realized. Typically, these nightmares are said to recur and to include an array of distress symptoms, including awakenings. Rarely can they be related to specific events, but the absence of verification does not seem to alter their effect on the dreamers. Some persons who recount these nightmares say they have been in therapy to deal with them, but this has not been successful. Part of the reason may be that few clinicians are aware that PTSD may conceivably derive from past-life as well as present-life trauma; because they do not acknowledge the apparent memories as possibly valid, they cannot encourage the cognitive work required for their clients to process the material consciously. The many parallels between past-life memory and present-life memory suggest that the same therapeutic techniques proposed for posttraumatic nightmares deriving from present life experience would be effective with those stemming from past-life experience. Indeed, there is some evidence for this (Bowman, 2010; Mills, 1994; Peres, 2012), although clearly more research is required in this area.

Reincarnation is the most forthright and in many respects the most satisfying way to explain Scott's nightmare and traumatic experiences. The possibility of reincarnation continues to meet resistance, due to the conviction that past-life memories and related phenomena can be explained as superpsi acquisitions, if not adherence to physicalist assumptions about the brain's production of consciousness that render postmortem survival inconceivable. Scott's case is not especially strong evidentially. Additionally, its weak corroboration means that evaluations must remain tentative. The evidence for reincarnation collected since Stevenson began systematic investigations in 1961 (Matlock, 2019; Mills & Tucker, 2015; Stevenson, 2001) is a great deal more extensive and of higher caliber than generally appreciated, however. Although no single case can hope to provide conclusive evidence for reincarnation, Scott's case introduces important new dimensions and should be considered within the larger research context in reaching a conclusion regarding its best interpretation.

Acknowledgements

I thank Scott Perry for being so forthcoming with his life experiences, answering my persistent questions, and supplying all requested documents. Scott reviewed the manuscript for accuracy before it was submitted for publication. I am appreciative also of his nephew sharing his recollections and assessments with me. Mike Lawler provided a good deal of assistance and he, Marilyn Elliott, and KM Wehrstein read over the manuscript in draft, making suggestions for its improvement. This research was supported by a grant from the Parapsychology Foundation.

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Scheinbare Erinnerungen an frühere Leben in einem wiederkehrenden Traum über die Neujahrsüberschwemmung von 1934 in Los Angeles

James G. Matlock

Zusammenfassung: Wie Erinnerungen an das gegenwärtige Leben können auch Erinnerungen an scheinbare frühere Leben in Träumen auftauchen, manchmal in alptraumhaften Träumen. In diesem Beitrag wird die Fallstudie eines Traums von einem traumatischen Ereignis (einem Todesfall) vorgestellt, das 36 Jahre vor der Geburt des Träumers stattgefunden hat. Der Traum wiederholte sich mehrmals im Monat vom Alter von 4 Jahren bis in die 20er Jahre. Der Träumer wachte stets in Angst und schweißgebadet auf und erinnerte den Traum. Dies sind Merkmale posttraumatischer Albträume, obwohl das Trauma hier aus einem früheren Leben zu stammen scheint und nicht aus dem gegenwärtigen Leben des Träumers. Noch in seinen 50ern erinnert sich der Träumer an das Ereignis und ist immer noch stark davon betroffen. Wiederkehrende Albträume sind bei Berichten über Erinnerungen an frühere Leben verbreitet, aber dieser Fall ist insofern ungewöhnlich, als der Traum genug Einzelheiten enthielt, um seine Hauptelemente zu verifizieren und den Protagonisten des Traums zu identifizieren. Das fragliche Ereignis war so undurchsichtig, die Erinnerung des Träumers jedoch so präzise, dass es unwahrscheinlich ist, dass der Träumer oder seine Familie vor Beginn der Träume davon erfahren haben könnte. Ich habe die Möglichkeit in Betracht gezogen, dass der Träumer die Informationen durch anomale Wahrnehmung erlangt hat, habe sie jedoch verworfen zum Teil aus mangelnden Beweisen dafür, dass Emotionen dieser Stärke durch Psi erlangt werden können. Obwohl kein Fall für sich genommen einen überzeugenden Beweis für Reinkarnation liefern kann, trägt dieser Fall zu dem wachsenden Forschungsstand bei, der diese Möglichkeit ernsthaft in Betracht zieht.

Eberhard Bauer

Alegadas Memórias de Vidas Passadas em um Sonho Recorrente Sobre a Enchente de Los Angeles no Ano Novo de 1934

James G. Matlock

Resumo: Assim como lembranças da vida atual, memórias de supostas vidas passadas podem aparecer em sonhos, por vezes em sonhos apavorantes. Este artigo apresenta o estudo de caso acerca de um sonho sobre um evento traumático (uma morte) que ocorreu 36 anos antes do nascimento do sonhador. O sonho se repetia várias vezes por mês a partir dos 4 anos de idade até o sonhador chegar na casa dos seus 20 anos. O sonho invariavelmente levava-o a acordar em aflição e suando frio e era recordado após o despertar. Estas são características de pesadelos pós-traumáticos, embora o trauma aqui pareça derivar de uma vida anterior, não da vida atual do sonhador. O sonhador continua a se lembrar do evento em seus 50 anos e ainda é severamente afetado por ele. Pesadelos recorrentes são comuns em relatos de memórias de vidas passadas, mas este caso é incomum, pois o sonho era suficientemente detalhado para permitir a verificação de seus principais elementos, bem como a identificação do protagonista do sonho. O evento em questão era suficientemente obscuro, embora a lembrança do sonhador fosse suficientemente precisa, tornando improvável que o sonhador ou sua família pudessem ter aprendido sobre ele antes do início de seus sonhos. Considerei a possibilidade de o sonhador ter adquirido as informações através de uma cognição anômala, mas a rejeitei em parte por falta de provas de que emoções desta ordem possam ser adquiridas via psi. Embora nenhum caso isolado possa fornecer provas convincentes da reencarnação, este caso se soma ao crescente corpo de pesquisa que torna esta possibilidade digna de séria consideração.

Antônio Lima

Recuerdos aparentes de vidas pasadas en un sueño recurrente de la Inundación de Año Nuevo de 1934 en Los Ángeles

James G. Matlock

Resumen: Al igual que los recuerdos de la vida presente, los recuerdos de aparentes vidas anteriores pueden aparecer en los sueños, a veces en pesadillas. Este artículo presenta el estudio de un caso de un sueño de un evento traumático (una muerte) que ocurrió 36 años antes del nacimiento del soñador. El sueño se repitió varias veces al mes desde los 4 años hasta que el soñador tenía 20 años. El sueño provocaba invariablemente un despertar angustiado y con sudor frío, y se recordaba después de despertar. Estas son las características de las pesadillas postraumáticas, aunque en este caso el trauma parece derivar de una vida anterior, no de la vida actual del soñador. El soñador sigue recordando el suceso a sus 50 años y sigue estando muy afectado por él. Las pesadillas recurrentes son comunes en los informes de recuerdos de vidas pasadas, pero este caso es inusual porque el sueño fue lo suficientemente detallado como para permitir la verificación de sus elementos principales, así como la identificación del protagonista del sueño. El acontecimiento en cuestión era tan oscuro y el recuerdo del soñador tan preciso como para que sea poco probable que el soñador o su familia pudieran haberse enterado de él antes de que comenzaran sus sueños. Considero la posibilidad de que el soñador adquiriera la información a través de una cognición anómala, pero la rechazó en parte por la falta de pruebas de que emociones de este orden puedan adquirirse a través de psi. Aunque ningún caso aislado puede aportar pruebas convincentes de la reencarnación, este caso se suma al creciente conjunto de investigaciones que hacen que la posibilidad merezca ser considerada seriamente.

Etzel Cardeña

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Letter to the Editor[1]

Alexander Moreira-Almeida
Universidade Federal de Juiz de Fora

Bruno Paz Mosqueiro
Federal University of Rio Grande do Sul

Dinesh Bhugra
King's College London

Dear Editor,

Thank you very much for the review of our book (Hood, 2022). We would like to draw your readers' attention to two minor corrections to it. First, the book does have a chapter on Islam by Professors Ahmed and Tarek Okasha. Second, Chapter 23 addresses some of the issues related to negative impact that religion/spirituality can have.

Reference

Hood, R. W. Jr. (2022). Conceptual and empirical variations in relations between spirituality and mental health (A review of *Spirituality and Mental Health Across Cultures*, A. Moreira-Almeida, B. Paz Mosqueiro, & D. Bhugra (Eds.)). *Journal of Anomalous Experience and Cognition, 2*(1), 188-194. https://doi.org/10.31156/jaex.23961

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https://doi.org/10.31156/jaex.24259

Recent Publications of Note[1]

Etzel Cardeña
Lund University

Anomalous Experiences

Fingelkurts, Andrew A., Fingelkurts, A. A., & Kallio-Tamminen, T. (2022). Self, Me and I in the repertoire of spontaneously occurring states of selfhood: Eight neurophenomenological case studies. *Cognitive Neurodynamics, 16*, 255-282. https://doi.org/10.1007/s11571-021-09719-5

A careful matching of EEG synchrony and altered experiences of selfhood in which different alterations of selfhood showed unique neurophenomenological profiles.

Lindsay, N., Tassell-Matamua, N., Haami, D., Ware, F., Valentine H., & Pomare, P. (2021) Construction of a 'Beliefs about Exceptional Experiences Scale' (BEES): Implications of preliminary findings in Aotearoa New Zealand. *Journal for the Study of Spirituality, 11*(2), 145-158, DOI: 10.1080/20440243.2021.1978136

Māori (Indigenous origins) respondents were much more likely to endorse exceptional (or anomalous) experiences that New Zealand Pākehā (European origins) ones.

Monteiro de Barros, M., Camelo Leão, F., Vallada Filho, H., Lucchetti, G., Moreira-Almeida, A., & Prieto Peres, M. F. (2022). Prevalence of spiritual and religious experiences in the gen-

[1] This regular feature summarizes recent papers of interest. If you want to recommend a paper, please send me a note with bibliographic information to etzel.cardena@psy.lu.se

https://doi.org/10.31156/jaex.24598

eral population: A Brazilian nationwide study. *Transcultural Psychiatry*. https://doi.org/10.1177/13634615221088701

A survey of more than a thousand Brazilians shows that vast majorities reported having experienced at least once various anomalous experiences including mystical (84%) and psi (83%) experiences.

Roseman, L., Winkelman, M. J., Preller, K. H., & Fotiou, E. (Eds.) (2022). Psychedelic sociality: Pharamacological and extrapharmacological perspectives. *Frontiers in Pharmacology*. https://www.frontiersin.org/research-topics/16967/psychedelic-sociality-pharmacological-and-extrapharmacological-perspectives

A journal issue with a plethora of articles and reviews (22 items) focused on the social and therapeutic implications of the use of psychedelics.

Spindola-Rodrigues, K. C., Reis, R. C., de Carvalho, C. M., de Siqueira, S. D. N. L.L., Rocha Neto, A. V., & Almeida, K. J. (2022). Cognitive health and differential cortical functioning in dissociative trance: An explorative study about mediumship. *Frontiers in Psychology, 13*(874720). Doi: 10.3389/fpsyg.2022.874720

The performance in neurocognitive tests of Brazilian spirit mediums was comparable to median or higher scores of Brazilians, particularly among those who had more than 10 years of practice. None met criteria for major depression but some with shorter practice reported mental disorders.

Wiseman, R., & Watt, C. (2022). Experiencing the impossible and creativity: A targeted literature review. *PeerJ, 10*:e13755. Doi: 10.7717/peerj.13755

Proposes that "unexpected and surprising experiences... promotes creative thinking," and analyses the relevant literature across six domains: entertainment magic, fantasy play, virtual reality and computer gaming, dreaming, science fiction/fantasy, and anomalous experience.

Anomalous Cognition

French, C. (2021, September 22). Why I now believe parapsychology is a science not a pseudoscience. *The Skeptic.* https://www.skeptic.org.uk/2021/09/why-i-now-believe-parapsychology-is-a-science-not-a-pseudoscience/

An informed and reasonable skeptic of the evidence for psi provides nonetheless arguments and evidence that counter the common accusation that it is pseudoscience.

Mertz, H. (2022). Random event generators and a first-person account of mind-matter interaction. *Journal of Consciousness Studies, 29*(5-6), 102-129.

A case study of an experimenter/participant who has engaged in a long-term project testing how different states of mind seem to affect the output of a random event generator.

2022, Vol. 2, No. 1, pp. 424-426

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