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EDITORIAL

What Is Swept Under the Rug?¹

Etzel Cardeña

Lund University

Abstract: Playing with the Occam’s razor trope, Nobel laureate Sidney Brenner coined the term *Occam’s broom* to describe the practice of sweeping under the rug facts that do not support the scientist’s hypothesis. This practice is taken to extremes by some critics of anomalous cognition research (psi), who engage in dismissing inconvenient research data (including sometimes their own), naturalistic observations, and eminent scientists supporting this research. They also engage in rhetoric in which they claim that psi ought not be considered unless published in mainstream journals while simultaneously blocking such publication, and fail to acknowledge methodological and statistical advances spurred by psi research.

Keywords: Science suppression, Occam’s razor, Occam’s broom, anomalous cognition, psi, parapsychology

Scientists often cite the metaphorical razor of 14th century philosopher Occam (or Ockham) that “entities are not to be multiplied without necessities,” to argue that theories with fewer hypotheses or entities are to be preferred to those that require more (or *principle of simplicity*). Similar ideas, however, were proposed centuries before Occam, for instance by Aristotle who wrote in *Posterior Analytics*: “We may assume the superiority *ce-teris paribus* [other things being equal] of the demonstration which derives from fewer postulates or hypotheses” [in Baker, 2016]). The dictum itself is not found in Occam’s works (Ariew, 1977), who might not have endorsed some of the cuts proposed by the epistemological barbers “because human beings can never be sure they know what is and what is not ‘beyond necessity’” (Baker, 2016). Particularly in our days of paradoxical quantum principles (e.g., particle/wave complementarity and uncertainty in physics) and chaos theory (small changes in nonlinear systems giving rise to large and unpredictable outcomes), what we find in micro and major systems is forbidding complexity rather than simplicity.

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EDITORIAL

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This editorial, however, is not primarily about Occam’s razor, but about another object in his household. In 1997, 2002 Nobel laureate in Physiology/Medicine Sidney Brenner (1997) coined the term *Occam’s broom* to describe sweeping “under the carpet any unpalatable facts that did not support the hypothesis” (p. R202). He stated how in many areas of modern biology “quite often neither the simplest theory, nor the most elegant... turned out to be right” (p. R202). If inconvenient data and observations are illegitimately swept under the carpet in mainstream areas, the practice is much worse with respect to research on psi/anomalous cognition, a topic that can stir vehement, even irrational, reactions by some who would like to eliminate it altogether. I will lift the rug now to reveal some of what is swept under it by some anti-psi authors (I reserve the term “skeptical” to those who, while not convinced by the evidence for psi, are nonetheless open to conducting research and considering it, e. g., French, 2021). I discuss a few examples out of a considerably larger number:

1) Research Data

A cornerstone of scientific practice is to produce data under carefully described and conducted conditions, which will be properly analyzed quantitative and/or qualitatively. For instance, we believe that the theoretically-predicted Higgs boson exists because scientists at the Large Hadron Collider (LHC) reported observations that were replicated by others and were beyond what would be expected by chance (e.g., Particle Data Group, 2020). There has been no attempt to deny the results even though the boson is not part of our ordinary experience nor is it easy or frequent to observe (it shows up only in about 1 in a billion particle collisions!).

A very different attitude is held by some with respect to the orders-of-magnitude smaller field of anomalous cognition. Reber and Alcock (2019a, b) provide examples of this attitude. Initially presented to the journal editors as a rebuttal to one of my papers (Cardena, 2018) reviewing the meta-analytical evidence for psi phenomena and discussing potential physics theories and authors that might accommodate it, Reber and Alcock (2019a) declared the existential invalidity of psi phenomena because “the laws” of physics (which is not their discipline) make psi impossible and concluded that the data “are necessarily flawed and result from weak methodology or improper data analysis, or are Type 1 errors” (p. 391). Did they then describe how the methodology of the studies was weak or the data analyses flawed? No, and they explained why in another paper in which they wrote that “the data are irrelevant” (Reber & Alcock, 2019b). Criticisms of their papers came from

multiple sources (e.g., <https://www.scientificexploration.org/journal/volume-33-issue-4-2019>) including a psi skeptic (<http://www.skeptophilia.com/2019/08/the-realm-of-impossible.html>).

A similar exclusion by fiat to that held by Reber and Alcock is an unfalsifiable in practice prior Bayesian estimate for psi phenomena of 10^{-20} (Wagenmakers et al., 2011), which ignores both previous research and naturalistic observations. Since at some point many findings now considered inarguable (e.g., atom immutability) were considered impossible, adopting this Bayesian estimate would have brought scientific development to a standstill a long time ago. Compare the certainties of the anti-psi authors with what 1965 Nobel physics laureate Richard Feynman (1981/1999) declared: “I have approximate answers and possible beliefs and different degrees of certainty about different things, but I am not absolutely sure about anything” (pp. 24-25; by the way, he was dismissive of psi but also of the social sciences in general).

Some psi critics even ignore their own research when it supports the psi hypothesis. Whenever the topic of psi research rears its head in a mainstream forum, it is *de rigueur* to dismiss it by appealing to *selective reporting* (aka as the file drawer effect). The argument is that the meta-analytic support for psi would be washed away by the assumed many studies that do not find evidence for it and do not get reported. This is a potential problem in any scientific area, not only psi, and the latter has had a better record of addressing it than most mainstream research areas until recently. For instance, in 1975 the Parapsychological Association adopted a policy against selective reporting only of supportive results, (Radin, 2007) and around that time also the *European Journal of Parapsychology* encouraged *registered reports* that would be peer-reviewed before data collection (Wiseman et al., 2019; for a response to the criticism of selective reporting in psi, see Cardena et al., 2015). In addition, meta-analyses of psi routinely evaluate mathematically potential selective reporting (e.g., Baptista et al., 2015).

And there is another type of selective reporting that is very rarely acknowledged: non-reporting of psi supportive studies. Here are two examples out of more (for a review see Carter, 2007). Susan Blackmore became a well-known vocal critic of psi after she claimed that her research on the field had failed to produce any evidence for it. However, a meta-analysis of her work by Rick Berger (1989) found that 30% of her own studies resulted in significant results, considerably more than would be expected by chance (for a full discussion, including Blackmore’s shifting conclusions, see Carter, 2007). In another example, Rupert Sheldrake (2015) described how

various critics (or their students) of the psi research paradigm of sensing being stared at obtained seemingly psi supportive results, which were not published and/or the data were discarded or not made accessible to him.

2. Naturalistic Observations

In a distinctly egocentric statement, Wagenmakers and collaborators (2011) wrote that psi “conflicts with what we know to be true about the world” (p. 46) which raises the question of who is this “we” and how they arrived to this conclusion. First, surveys from industrialized cultures reveal that majorities of people state that they have had ostensible psi phenomena (Watt & Tierney, 2015), so even if Wagenmakers et al. have never encountered an experience that challenged their views, they cannot speak for most people. This difference is even greater with respect to some non-Western cultures (e.g., Monteiro de Barros et al., 2022). There has been laboratory psi research precisely because in everyday life some people encounter events suggesting that their sentience is not temporally or spatially as limited as the senses or reasons would indicate. The usual anti-psi default position is that these everyday events can be explained as random unusual events, but that seems an unlikely explanation for carefully observed repeated accurate reports by a few individuals (e.g., Gauld, 1982) or independent group of people (cf. Knight, 2019). It encounters even more difficulties to explain controlled research based on observations/reports from everyday life such as guessing more often than would be expected by chance when someone is calling (Sheldrake, 2015; for a review of research on spontaneous case studies see Kelly & Tucker, 2015). The egocentric epistemic perspective articulated by Wagenmakers et al. (2011) in which one’s perspective is seen as the only real or rational one (cf. Greenwald, 1980) has also hindered the study of experiences that though unusual are not *per se* pathological, can have important consequences (Cardeña et al., 2014), and have influenced scientific discovery, philosophy, and the humanities, even if not typically acknowledged (Cardeña & Winkelman, 2011).

3. Eminent Scientists Supportive of Conducting Research on Psi

The first major organization dedicated to the scientific study of psi, the Society for Psychical Research (SPR), founded in 1882, early on included such luminaries as Nobel laureates Lord Rayleigh, Charles Richet,

and J. J. Thompson, one of the most important philosophers of ethics, Henry Sidgwick, and a psychologist/philosopher whose influence continues to reverberate to our days, William James. Overall, more than 30 Nobel prizewinners (including the Curies, Einstein, and Planck) and hundreds of other very eminent figures in the sciences, the arts, and politics, have been supportive of research in psi (for a list see Cardeña, 2015). Yet, when mention is made of, for instance, the genius of Marie Curie, William James, or Freeman Dyson, their support of psi is kept well under the rug. The historian of science Richard Noakes (2020) has given a thorough account of how foundational physicists of around 1870-1930 took the study of psi as an extension of their work in mainstream topics, not as woo-woo.

Speaking of which, the best-selling psychologist Steven Pinker in his most recent book *Rationality* and in other venues has derided what he calls “paranormal woo-woo” (e.g., <https://www.bbc.co.uk/mediacentre/2021/radio-4-think-with-pinker>), basing his opinion in his own sense of rationality and the opinion of contemporary physicist Sean Carroll, who denies the possibility of psi. Mentioning the perspective of Carroll is of course perfectly adequate, but as taught in Methodology 101 one should also address alternative perspectives. Yet Pinker fails to mention recent or contemporary distinguished physicists who have proposed models of psi including Costa de Beauregard (1998), David Bohm (1986), Bernard Carr (2015), and Henry Stapp (2017), and multiple award winner computer scientist Richard Shoup (2015), among others (for a devastating criticism of Pinker’s level of scholarship in a different area see Dwyer and Micale, 2021).

Another example is a short book review on the thorny demarcation problem in science. *Science News* writer Tom Siegfried (2021), in a figurative pen dripping condescension, described psi as “wishful thinking delusions” that even for a time was “taken seriously by some ‘modern’ scientists” (p. 30). That same author in that same magazine a few months later (Siegfried, 2022) wrote about foundational figures in quantum mechanics (which I assume he would consider truly modern) including John Bell, David Bohm, Albert Einstein, Pascual Jordan, and Max Planck, all of them having at the very least expressed interest in psi research (Cardeña, 2015a). It is not unusual to find anti-psi authors writing as if *scientists* had unequivocally refuted psi, when surveys and the fact that the Parapsychological Association has been an affiliate of the AAAS since 1969 counter that assertion (Cardeña, 2015b).

4. The Strategy of Suppressing Publication of Psi Research While Arguing that

It Would Be Accepted if It Had Been Published (the Catch-22)

Catch-22 is the name of the war-time novel by Joseph Heller (later made into a movie with the same title) that describes regulation 22 “a concern for one's safety in the face of dangers that were real and immediate was the process of a rational mind. Orr was crazy and could be grounded. All he had to do was ask; and as soon as he did, he would no longer be crazy and would have to fly more missions” (Heller, 1955, p. 35). In other words, there is no way out of being exposed to being killed, despite an apparent escape clause. In the case of anti-psi authors, consider the bombastic responses by cognitive scientist Douglas Hofstadter and astrophysicist David Helfland (<https://www.nytimes.com/roomfordebate/2011/01/06/the-esp-study-when-science-goes-psyhic>) to a set of studies published by an eminent psychologist in an important journal (Bem, 2011). They fulminated against the sheer audacity of publishing a paper that underwent the regular scientific standards of peer review, while at the same time stating that they were defending science (fortunately other scientists commenting on that paper had a far more measured response). Consider also Reber and Alcock's (2019a) assertion that “parapsychological research has failed to yield evidence to support [it]” while simultaneously refusing to look at that evidence. Some years ago, a Yale psychology department chair (Child, 1987, 222-223) described the oxymoronic argument by psi critic Hyman that before considering a psi explanation there should be a scientific context for it, which evidently cannot be developed unless there is research on the topic that clarifies it.

At the same time, there is a “questionable publication practice” (let us call it QPP), in which research papers presenting evidence supportive of psi are suppressed by some venues (see various examples from the journal *Foundations in Human Neuroscience*, TED, Wikipedia, etc. described in Cardena, 2015b). Most recently, PLOS ONE Associate Editor Avanti Dey wrote to Dr. Delorme and coauthors about their submission that “This study investigates the topic of psi phenomena, however this is based on the premise that psi ability is a valid and reproducible phenomenon. As the experimental and scientific validity of such phenomena have not been demonstrated nor initially established, we feel that this study lacks scientific relevance and would not contribute towards academic knowledge. As such, we cannot justify inclusion in PLOS ONE.” Notice that there is no mention of intrinsic weaknesses of the submission. Thus, psi would be considered as a topic if evidence for

it was published, but no publication will be allowed until its validity has established. As Dorfman (2022), a politically censored author remarks, many religious or secular censors “often perceive themselves as protecting [us]... from corrosion and corruption” (p. 32), for which they are more than willing to bend their own rules.

5. Recognition that Various “Mainstream” Developments Originated in Psi Research

Considering the complexity of the topic studied, it should not be a surprise that, although typically unacknowledged by critics, important methodological developments in the behavioral sciences have sprung from psi research. They include:

1. First use of randomization and detailed description of statistical analyses in behavioral studies (Richet, 1884; for an analysis see Alvarado, 2008).
2. First systematic use of a meta-analysis (Pratt et al., 1940).
3. Early use of registered reports (Wiseman et al., 2019).

The psi field has also encouraged the development of rigorous statistical analyses and initiated or had foundational contributions to content areas including nonconscious processes, hypnosis, eye-witnessing, research decline effects, and the systematic study of dissociative and other anomalous experiences (for a review see Hövelmann, 2015). In this editorial I could also discuss the red herring that psi research should follow stricter (typically unspecified) evidential criteria than those required for other areas in science, the “exceptional claims require exceptional proof” mantra, but it would require a long discussion, which I will leave for another occasion. I focused here on illegitimate criticism by anti-psi authors, but it should be mentioned that dogmatic pro-psi authors also sweep inconvenient facts under the rug (Cardena, 2011), a common but unsanitary practice.

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Quantum Measurement as Pragmatic Information Transfer:

Observer Effects on (S)Objective Reality Formation¹

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Abstract: *Objective:* In this study, quantum measurement is conceptualized as pragmatic information transfer when an intentional observer perceives motive-relevant quantum-based outcomes. Owing to the nature of pragmatic information as described in Lucadou's Model of Pragmatic Information, this information transfer causes an observer-dependent intentional co-formation of reality and can only be scientifically documented under reduced objectivity conditions. The effects thus reflect a "subjective" reality that occupies the space between subjectivity and objectivity. The present study was designed to find evidence for the existence of this subjective reality. *Method:* A pre-registered micro-psychokinesis task involving a quantum random number generator assessed the impact of intentional observation on quantum-based stochastic outcomes under experimental variations of the applied measures' objectivity. *Results:* As predicted, an intentionally congruent bias in quantum-based outcomes was observed using subjective memory data from the observations when additional objective computer-stored data were not inspected and finally erased (i.e., objectivity was reduced). Quantum randomness was confirmed in a maximum objective data collection context for both stored and memory data. *Conclusion:* The results indicate that pragmatic information was transferred during trial observation when scientific objectivity was reduced. The evidence for intentionally based reality formation or quantum-based random reality emergence was shown to be a function of the measurements' objectivity levels. The data suggest the existence of a subjective reality and that a physicalist/materialist or an intentional creation worldview depends on the presence of an intentional agent and the definition of the measurement process.

Keywords: Pragmatic information, quantum observation, duality, micro-PK, quantum random number generator, intentional creation

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Highlights

- Based on the model of pragmatic information (MPI) observer-dependent biases (micro-PK effects) were assumed to constitute a form of intentional agency on reality construction as opposed to passive reality registration.
- Experimental manipulations of the amount of objectivity involved in testing micro-PK effects were established and robust micro-PK effects were predicted for reduced objective conditions only.
- There were intentional observer effects on quantum-random outcomes (micro-PK) depending on different degrees of the applied measures' scientific objectivity.
- The data suggest that Descartes' duality approach (subjective vs. objective reality) should be supplemented by a third so-called subjective reality lying in between the two, which solely provides the basis for intentional agency.

The theme of human agency is central to the life sciences. It considers how an individual's conscious or unconscious intentions, motivational goals, needs, desires, or volitional processes—such as conscious acts of free will—are translated into concurrent changes in the individual's physical environment. Many psychological theories of action control (e.g., Heckhausen & Gollwitzer, 1987; Ryan & Deci, 2017) describe how an individual's mind shapes its environment. Thus, these theories essentially concern the immaterial impact of an individual's subjective reality on the objective world. The underlying implicit assumption within most theoretical frameworks in psychology and cognitive neurosciences is that the brain functions as an interface between mind—subjective reality—and matter—objective reality. However, the idea that the brain functions as an interface between both forms of reality is highly problematic. Since the brain is part of the material world and thus an inherent component of objective reality, a gap remains between the subjective and objective worlds. Philosophers of mind address this gap as the "hard problem of consciousness" (Chalmers, 1995; see also Levine, 1983; Nagel, 1974) and argue that subjective states, such as consciousness, cannot be derived from a physical entity such as the brain. Moreover, the hard "problem of free will" (Shariff et al., 2008) emphasizes the

fact that mental processes cannot interact with the brain's physical properties since they are mutually exclusive. How can a non-material concept such as the mind causally affect a material reality, particularly under the premise of causal closure in the physical domain?

Based on findings regarding intentional observer effects on quantum-based stochastic outcomes, Jahn and Dunne (1997) argued that the mind itself creates reality. Thus, an intentionally acting individual does not influence objective reality by producing certain actions, rather, through acts of intentional observation, individuals influence the emergence of an objective reality that features characteristics that align with their goals. This process may be considered a type of “goal-oriented creation of reality.” Jahn and Dunne's interpretation has been supported by their own and others' use of micro-psychokinesis (micro-PK) tests that assess the effect of intentional observation on quantum-based stochastic outcomes, usually produced by a quantum random number generator (qRNG; for an overview, see Varvoglīs & Bancel, 2015).

Micro-PK research using qRNGs has a long-established tradition (Schmidt, 1970, 1974), with numerous studies applying different variations in observers' intentions and various outcome measures. A qRNG uses a quantum process to establish a superposition of two potential states, such as the decay or non-decay of an atom (Schmidt, 1974) or a photon taking one of two potential paths. The possible quantum trial outcomes are then associated with a consciously experienced event—for example, the illumination of a lamp to the left or to the right in a circular display (Schmidt, 1970); the upward and downward movements of a random walk graphically displayed on a computer screen (Jahn et al., 1997); or the presentation of a positive or negative image on a computer screen (Maier et al., 2018). The volunteer's explicit or implicit task is then to mentally influence the experienced event and therefore the outcome of the quantum system.

Numerous studies have been conducted with different variations in observers' intentions and outcome measures and have yielded an impressive amount of data. Several meta-analyses of these studies observed an overall significant effect that supports observer-dependent variations in quantum randomness (Bösch et al., 2006; Duggan & Tressoldi, 2021; May et al., 1995; Radin & Nelson, 1989; for an overview see Varvoglīs & Bancel, 2015), although a certain decline in the effect across studies has also been reported (Bierman, 2001; Lucadou, 2015) along with difficulties in replicating original findings (e.g., Dechamps et al., 2021; Jahn et al.,

2000; Maier & Dechamps, 2018). These micro-PK effects may represent the influence of subjectivity and intentionality on objective reality, which suggests a transformation of subjective information—encoded in the individuals' conscious and unconscious goals, intentions, motives, and desires—into objective facts manifested in qRNG outcomes (Bierman, 2001; Jahn & Dunne, 1997). Micro-PK phenomena may thus transcend the duality of the subjective and objective worlds that Descartes (1641) initially proposed.

Jahn and Dunne (1997) recognized that such effects cannot be studied in a purely objective manner—which is necessary for the science of objective facts—and proposed as an alternative the unification of these dual aspects into a new “science of the subjective,” adding to the “physics of observation” a new domain concerning the “physics of experience” (p. 213). The latter addresses the study of intentions, needs, and desires and their interaction with the surrounding environment's physical properties. A deterministic or quasi-deterministic worldview would thus be complemented by a teleological approach, which would function as a “keystone of the proposed science of the subjective” (Jahn & Dunne, 1997, p. 219). Similarly, Bierman (2001) argued that when consciousness interacts with matter, as is the case in micro-PK, an underlying reality arises between the purely subjective and objective realities that serves as an interface between both.

Another well-documented phenomenon in micro-PK research is the elusive nature of these effects, indicated by a decline in effect sizes across several decades of micro-PK research (Bierman, 2001), the non-replicability of original results despite the original existence of strong evidence for an effect (e.g., Dechamps et al., 2021; Jahn et al., 2000; Maier & Dechamps, 2018) and by the varying robustness of micro-PK effects within studies (e.g., Jakob et al., 2020; Lucadou, 2015; Maier et al., 2021). This elusive dimension may be an artifact and simply be the consequence of psi's inexistence (Wiseman, 2010). Nevertheless, the particularities of this elusive aspect have been observed in experimental conditions with sufficient consistency as to lend credibility to the hypothesis that elusivity may be a specific property of micro-PK phenomena. In this regard, Bierman (2001) proposed that any attempt to push a goal-oriented “impulse” from subjective into objective reality would ultimately destroy the objective status of these phenomena. That is, the impact of a unifying reality—a third reality beyond the objective and subjective worlds cannot be scientifically studied in a wholly objective manner that includes scientific standards, such as purely objective measurements, replicability, and robustness.

Von Lucadou formalized this conjecture more precisely with the Model of Pragmatic Information (MPI; Lucadou 1984, 1987, 1995, 1998, 2001, 2015; Lucadou et al., 2007). It considers micro-PK effects to be macroscopic entanglement correlations (ECs). ECs, which are described in quantum physics, follow quantum mechanical rules, and cannot be treated as causal signals (= 1st law; Lucadou, 2015) (Entanglement correlations are non-local correlations between quantum states that belong to one system observed after measurement, Schrödinger, 1935). Robust and replicable evidence for macroscopic/generalized ECs would allow the experimenter to use these results for non-local signal transfer. Since this would violate the ECs' nature, any signal-type evidence should decline after an effect has originally been documented (= 2nd law, Lucadou, 2015; also called the non-transmission [NT]-axiom; Lucadou et al., 2007). From a system-approach perspective, ECs are only present in closed subsystems and are not meant to communicate outside the system. They are thus recognizable only within a local (i.e., not fully objective) reality and tend to disappear when they are shared outside the system (i.e., when made objective).

In sum, any goal-oriented individual attempt to shape the physical environment implies a transfer of information from the subjective to the objective realm. Since the two are mutually exclusive, a third form of reality that may facilitate this transfer is proposed, echoing the proposals of Pauli and Jung (Atmanspacher & Fuchs, 2017; Pauli et al., 2000) and Bohm (Bohm & Fowler, 1978). This reality's key characteristic is that it is neither subjective nor objective but a mixture of both, rendering scientific documentation in purely objective terms impossible (Bierman, 2001; Jahn & Dunne, 1997; Lucadou et al., 2007). In what follows, we will investigate how this reality might nevertheless be explored scientifically.

Pragmatic Information and Subjective Reality

The theoretical framework detailed here is an elaboration and formalization of the ideas concerning the reality underlying micro-PK effects articulated by Jahn and Dunne (1997), Bierman (2001), and Lucadou et al. (2007). The subjective-objective distinction and the third reality introduced by Bierman (2001) will be described in information theoretical terms using the concept of pragmatic information proposed by von Weizsäcker (1974) and later applied to psi research by Lucadou.

The concept of pragmatic information was developed to characterize intentional and goal-oriented effects through information transfer from a sender to a receiver (von Weizsäcker, 1974). More precisely, pragmatic information (I_p) is defined as information through which the sender intends to elicit a certain reaction from the receiver. I_p consists of two complementary and multiplicatively related aspects. First, the sender's goal-oriented impulse is encoded in a message called "novelty" (N), which concerns the autonomous, individual aspect of the message that is new and unpredictable to the receiver. It is the content of the sender's message, expressed to induce goal-related changes (cognitive or behavioral) in the receiver. This aspect emerges from the individual sender and is only known and controlled by him/her beforehand. The second aspect is "confirmation" (C), which corresponds to what is already known between the sender and the receiver and allows them to communicate. It includes all informational features that both sender and receiver already share beforehand and serve as carriers of the message. Pragmatic information can then be translated into the following formula: $I_p = N * C$. If either N or C is zero, no I_p is produced. Moreover, since N and C are complementarily related to one another and I_p is necessarily limited within a system, an increase in N causes a reduction in C and vice versa (see Lucadou, 2015). For example, if the sender's message is coded in a foreign language that is unknown to the receiver, $C = 0$, I_p would be zero, and the message will not have the intended effect despite the high level of N. Similarly, if no N is provided—that is, if no new goal is encoded in the message ($N = 0$)— I_p would be also zero. In this case, the receiver will passively register the information obtained from the sender without undergoing any transformation. By contrast, I_p will reach a maximum when a message contains N and C in equal amounts. Consequently, the goal-oriented impulses needed for the creation of realities—as assumed in micro-PK experiments (Jahn & Dunne, 1997)—require an I_p greater than zero, which means that (1) neither N nor C are at their minimum and (2) neither N nor C are at their maximum, since otherwise the complementary factor would become zero.

In the MPI, Lucadou applied the I_p concept to the scientific measurement process (e.g., Lucadou, 2015), and we now apply the concept to the objectivity and subjectivity duality. The particle physicist Bernard d'Espagnat (2006) provided a definition of objectivity that strongly referred to the process of measurement in science. D'Espagnat (2006, pp. 93-94) defined objectivity in terms of statements based on measurements that inform us of some attributes of the things under study in an unbiased, observer-independent way. Objectivity in

science is –according to this view– reached when the measurement instrument (MI) and measurement object (MO) are completely separate ($MI \neq MO$). Such scenarios of unbiased measurement will henceforth be called “non-invasive measurement” and constitute an ideal conjecture for attaining perfect objectivity. MIs are supposed to passively register an objective and independent reality. According to the I_p concept, an MI can be considered a channel and has no individual impact ($N = 0$) on the measured object. Objective reality is thus defined as a realm wherein confirmation (C) is maximized to attain perfectly objective descriptions of its constituents. The consequence of this scientific success is that all forms of N are excluded from this objective world, and I_p is zero (owing to the equation: $I_p = N * C$ and the complementary relation between N and C). Accordingly, no goal-oriented process, including psi, can emerge in this framework, in which everything is merely a product of objective and deterministic natural laws. Observers are thus reduced to “channels” that register events in the objective world but do not intentionally impact it. Jahn and Dunne (1997) called this the “physics of observation,” and it corresponds to a physicalist worldview.

Subjective reality does not contain I_p either. Subjectivity is a pure experience composed of qualia that cannot be communicated to others. It remains within the individual and cannot be accessed from a third-person perspective (Levine, 1983; Nagel, 1974). This subjective reality is characterized by high amounts of autonomy, individuality, and intentionality, since all experiences are related to the self and are constructed from its motives and individual goals. From a measurement perspective, subjective experiences are defined by reality construction through introspection—that is, the MI and MO are merged ($MI = MO$). A maximally biased measurement, henceforth invasive measurement, is the result, leading to a maximization of N, reflecting the goal-oriented representation of experiences in an idiosyncratic manner. Subjective experiences cannot be communicated directly to others; consequently, C is zero, which matches the fact that N is at its maximum. Consequently, the I_p within subjective reality must be zero.

As described in the previous paragraphs the theoretical concepts C and N both underwent a transition from its original meaning in communication science to its meaning in measurement-related theories such as the MPI and our approach. In von Weizsäcker’s (1974) original pragmatic information theory C was defined as the informational aspect shared between two interacting individuals and thus confirmed by both during an information transfer from a sender to a receiver to enable communication. In the MPI the information transfer

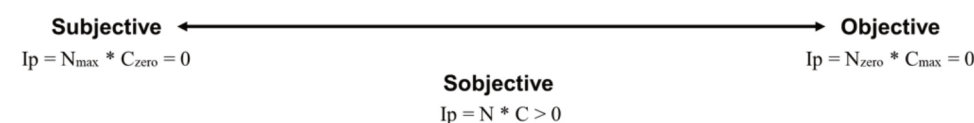
is translated into an interaction between observer and observandum during measurement processes. C in this context means stable, robust, and replicable results when the same observandum is observed multiple times. In our theory, C is closely related to the conceptualizations of Lucadou et al. (2007) and d’Espagnat (2006) and highlights the precondition leading to robust and replicable findings: C reflects the degree to which measurements are just passive registrations of measurement-independent facts that exist prior to observations as opposed to reality constructions. C is dominant when no biasing effects of individual observers on the observanda during measurements occur. Multiple passive-registrations of the same observandum leading to the same results, as is the case with robustness and replicability in science, allow an observandum to be defined as objectively real. Thus, C_{max} naturally leads to the definition of an objective reality in terms of measurement-independent facts. N in von Weizsäcker’s (1974) theory was defined as the meaningful content of the message encoded autonomously by the sender and reflects his or her intention to change a knowledge state within a receiver. Within the MPI’s measurement framework, N defines the active, causal impact through which observers affect the measurement outcomes transforming them into signals. Similarly, in our approach N reflects the degree to which measurements are active reality constructions. These constructions are based on the observers’ goals, motives, and desires to form a subjective percept. Thus, under N_{max} a fully individually constructed subjective reality created by the intentional agency of a perceiver is reached.

The logical correspondence of specific variations of I_p to subjective ($I_p = N_{max} * C_{zero} = 0$) and objective realities ($I_p = N_{zero} * C_{max} = 0$) explains why $I_p > 0$ cannot be located in either of the two realities alone. To conceptualize intentional and goal-oriented agency, central to micro-PK (but also to motivation, volition, free will, etc.), a third form of reality in which $I_p > 0$ may be necessary. Based on psi research and decline effects, Bierman (2001) inferred the existence of a reality that is neither subjective nor fully objective, overcoming the Cartesian duality, and proposed that this third form of reality be called the “tribal reality”; we propose that it be renamed “subjective” reality, given its function as an interface between the subjective and objective worlds. The specific feature of this reality, with respect to measurement and objectivity, is that a fully objective confirmation of phenomena arising from it cannot be reached since C cannot be maximum (since $N > 0$). The scientific criterion of objective evidence cannot be met when studying micro-PK. The MPI’s second law, which states that psi effects vanish when their existence is confirmed objectively formalizes this fact. This approach implies a transition from a “physics of observation” to a “physics of experience” as postulated by Jahn and Dunne (1997).

One might wonder whether this approaches a self-immunization strategy by arguing that micro-PK or other psi effects cannot be studied on objective scientific grounds and can only be experienced subjectively. However, this extrapolation is based on Cartesian duality's conviction that reality is either subjective or objective. By contrast, we suppose that both constitute the end points of a continuum that encompasses varying degrees of subjectivity (see Fig. 1). Subjective phenomena might then be studied scientifically under circumstances in which measurement objectivity is reduced (i.e., $C < 100\%$) but not completely zero (i.e., $C > 0$). In this regard, Lucadou and Zahradnik (2004) offered theoretical propositions that recurrent spontaneous psychokinesis (RSPK) phenomena's effect sizes should be a function of the quality of the phenomenon's documentation (i.e., confirmation [C]). A reduction in the quality of documentation should favor the occurrence of these effects. The present research applies this proposition to experimental conditions and aims to investigate micro-PK effects under variations of C—that is, with different degrees of objectification of the effect. Since micro-PK involves intentional observer effects on quantum-based stochastic outcomes, a short digression concerning quantum mechanics, an explanation of the measurement process and its relationship to I_p is warranted here.

Figure 1

The Pseudo-Duality of Objective vs. Subjective Reality Described as a Continuum of Degrees of Subjective Reality as a Function of Novelty (N) and Confirmation (C) Within Pragmatic Information (Ip)



Quantum Randomness and Pragmatic Information

In this section, we examine the most basic assumptions quantum mechanics made about the measurement process and underlying reality (for overviews see Becker, 2018; d'Espagnat, 2006). According to a mainstream interpretation of the findings of quantum physics—the “Copenhagen interpretation”—we cannot define the world before quantum measurement (Becker, 2018; Bell, 1964). Some physicists, such as d'Espagnat (2006), believe that the measurement of quantum systems will in fact create reality. In this case, measurement

is thus highly invasive, which means that the MI fully overlaps with the MO ($MI = MO$). Nevertheless, the outcome of a quantum measurement is stochastic in nature owing to the indeterminacy principle (Bell, 1964; Kochen & Specker, 1967; for an overview see Becker, 2018). Thus, the MI has no impact ($N = 0$) on the specific result a measurement might produce and therefore does not achieve the full criterion of subjectivity in terms of goal-oriented experiences of reality. In other words, quantum randomness during measurement “saves” objectivity in physics but only in a weak objective sense (d'Espagnat, 2006). Data obtained from fully invasive ($MI = MO$) quantum measurements follow probability rules that are apparently inherent in objective reality (Born, 1926). Quantum mechanical research produces results that are highly predictable through probability functions and can be confirmed through trial repetition with an unsurpassed high degree of accuracy. The indeterminacy principle is considered an ontic feature of this reality and leads to a C_{max} that is distinctive for science. Within it, there is no room for observers' intentions, given that C_{max} implies $N = 0$ in this configuration. The quantum indeterminacy principle thus guarantees objectivity in this area of physics in which measurement creates reality and is devoid of any intentional agency.

The “physics of experience” (Jahn & Dunne, 1997) and its operationalization through micro-PK challenges the ontic nature of quantum randomness and by doing so challenges the C_{max} criterion. Any observer-dependent biasing of quantum randomness would finally reveal a reality in which intentional agency can take place ($N > 0$), and C would no longer be maximum, but I_p would be greater than zero. A strategy that investigates observer-dependent biases in quantum randomness using C_{max} scientific standards would ultimately confirm quantum randomness. It is thus of paramount importance in micro-PK research to choose scientific methods that work with reduced Cs and possibly compare them to conditions in which C is maximized (Lucadou & Zahradnik, 2004). This would indicate that quantum randomness is merely a function of optimizing C, and reliable evidence for intentional biases in quantum randomness can occur under reduced objectivity ($C < C_{max}$) conditions—that is, with subjective methods.

The Present Study: Can We Study the Impact of Objectivity?

The present study's goal was to find evidence for the existence of a subjective reality that fills the gap between the duality of the subjective and objective worlds. More precisely, subjectivity was considered a realm

in which $I_p > 0$, which implied that we could study the impact of reduced confirmation (C) on the emergence of psi effects.

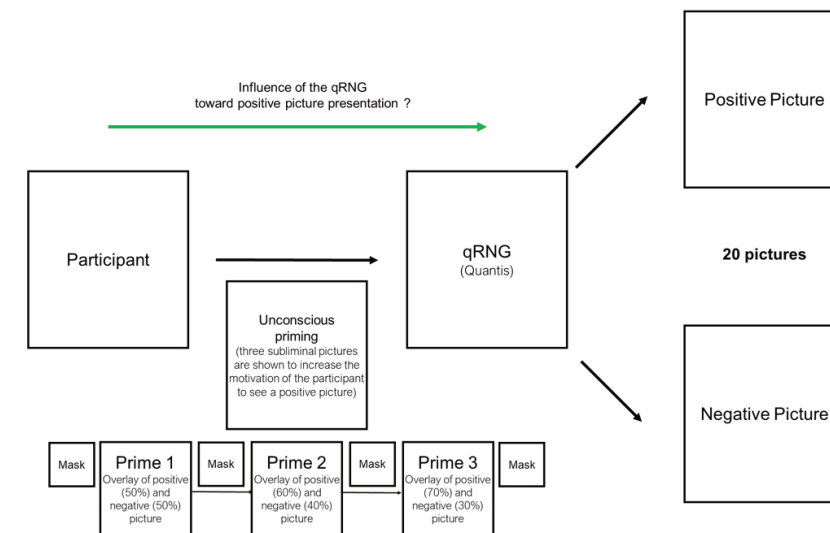
Study participants performed a micro-PK task that replicated one condition in a series of studies recently conducted by Dechamps et al. (2021). A quantum-based random number generator (qRNG) was used in each trial to determine whether the participant would observe a positive or negative image. The participant's intention to see positive images was evoked by the nature of the task and was further primed subliminally to enhance its motivational impact (see Fig. 2). Research demonstrated an effect (strong Bayesian evidence) on positive image presentations in a first study (the qRNG had "chosen" the positive image more frequently), and a subsequent decline in this effect with null findings confirming quantum randomness was reported in two subsequent studies using the same protocol (Dechamps et al., 2021). Thus, on the objective level of evidence, null effects currently occur in this design. The main reasons for applying this design in our research reported here was that: a) it provided a promising task to find strong evidence for micro-PK as demonstrated by Dechamps et al. (2021, Study 1) and might thus allow those effects to re-appear on reduced objective/more subjective data and that b) the further trend with regard to the objective micro-PK data subsequently indicated strong evidence for a null effect (Dechamps et al., 2021, Studies 2 and 3) proposing that C_{max} has been already reached by this design and in further replication attempts null effects will be obtained when objective data are analyzed.

The present study varied the objectivity (C) of micro-PK measures. Two micro-PK dependent variables were used in this design: the number of positive images selected by the qRNG and stored (or deleted; see below) in a data file (objective number), and the recall performance of this number derived from participants' memory stored in a data file (subjective number). Two within-subjects conditions were established. In the control condition, the objective number of positive images together with the subjective recall of this number were assessed (C_{max} condition). In the experimental

condition, the objective data were automatically deleted before inspection by the experiment designers, and only subjective memory data were available ($C_{reduced}$ condition). Thus, the measures applied within each condition involved a variation in the degree of objectivity (= variation of C) (see Fig. 3). We predicted that a micro-PK effect would be found in the experimental condition with quantitative data representing participants' subjective experiences ($C_{reduced}$). No micro-PK effect and evidence for a random distribution of positive images was predicted for the control condition's subjective as well as objective data (C_{max}). The study and its predictions were pre-registered at OSF (<https://osf.io/cr42j>).

Figure 2

Overview of the Design (Experimental Condition with 20 Trials) of Dechamps et al.'s (2021) Studies 1 to 3



Methods

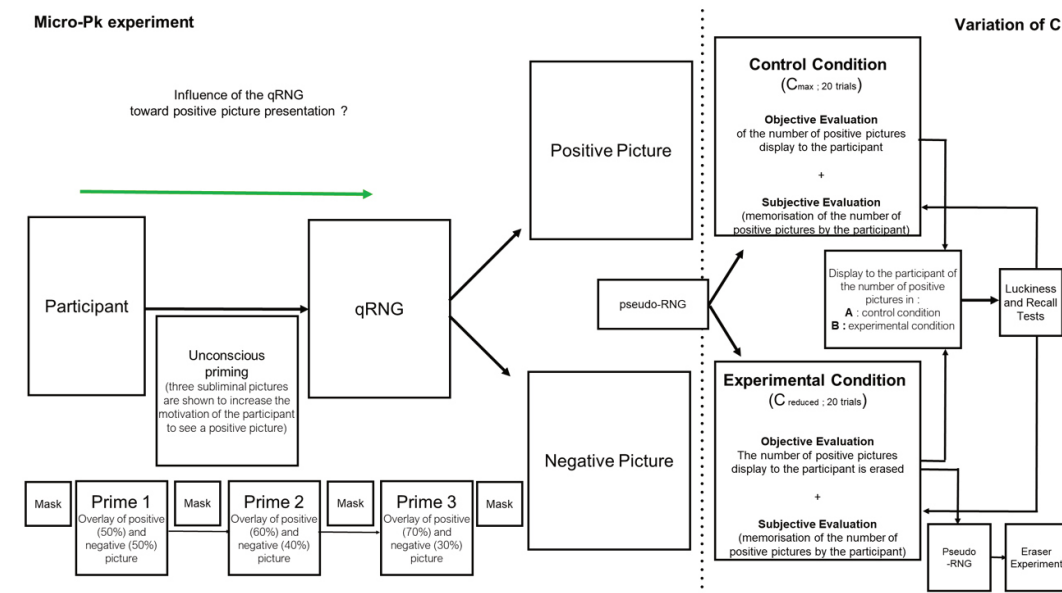
Participants

The study's sample comprised German participants (≥ 18 years of age) distributed throughout the country (see below the age and gender characteristics). Participant recruitment and data collection

were organized by Kantar, who distributed invitations to participate in the study to a random selection of their participant pool daily via email, aiming for a completion rate of about 100 per day. Participants consented to participate in the study electronically by pressing an accept button prior to the experiment. They were informed in general terms about the study, advised that participation was voluntary, and given a brief written explanation of the study's purpose after its completion (informed consent procedure). All saved data were coded, stored, and analyzed anonymously. The ethical board of the Department of Psychology at LMU Munich and Kantar—a data collection company specializing in online surveys that conducted the data collection—approved this procedure.

Figure 3

Overview of the Present Study's Design (40 trials)



Data Collection

The data collection took place during October 2020. We used a Bayesian approach in this study. Bayesian inference statistics allow for data accumulation (i.e., the addition of individuals' data until a specific stopping criterion has been met). The micro-PK effects for the experimental ($C_{reduced}$) and control (C_{max}) conditions were assessed using Bayesian one-sample t -tests testing whether the mean scores of positive images would exceed chance expectations in the experimental and control conditions (for objective and subjective

data). The following procedural details were specified in the pre-registration: a Bayesian factor (BF) = 10 indicating strong evidence for either H_0 or H_1 in the experimental condition was defined as the stopping rule. The uninformed prior for the one-sample Bayesian t -tests, with a one-tailed approach to the analyses performed, followed a Cauchy distribution centered around 0.05 with an $r = .05$ (i.e., $\delta \sim \text{Cauchy} [0.05, 0.05]$). This prior was based on an estimated effect size of $d_{\text{cohen}} = .1$ and was the same as in Dechamps et al. (2021, Studies 2–3). These Bayesian analyses were performed on an irregular basis (more-or-less weekly) with the respective actualized sample's mean scores. We used the statistical software R's Bayes Factor packages for Bayesian analyses.

The stopping criterion of $BF_{10} = 10$ was surpassed in the data from the experimental condition at sample size $n = 856$. At the point of data analysis, data from an additional 42 participants had already been collected, resulting in a total sample size of $N = 898$: 54.5% male, 45.2% female, 0.2% diverse; $M_{\text{age}} = 54.41$, $SD_{\text{age}} = 16.82$.

Materials

Experimental Program

This study partially replicated Dechamps et al.'s (2021) Study 1. The original study had two experimental conditions: a positive and a neutral subliminal image priming condition. As in the original studies, the present study was run as an online experiment. All participants could take part from any location using their private computers and internet access. The experiment was executed using a dedicated web server displayed on the participants' web browsers. The program was implemented using jsPsych (v 5.0.3; de Leeuw, 2015), a JavaScript library designed to run online behavioral experiments.

Stimuli

Positive and negative images were used as target stimuli, and a mixture of them were used as prime stimuli. The target stimulus sets consisted of photographs obtained from Shutterstock, a provider of royalty-free stock images. The positive target stimuli comprised 20 photographs depicting pets, peaceful landscapes, and groups of happy-looking people. Negative target stimuli were 20 photographs depicting dangerous or attacking animals and cataclysmal scenarios. The stimulus material was converted to black and white to balance out a general inequality

with respect to the coloring of the positive and negative images. Both target sets were matched; that is, each positive target picture had a negative counterpart that was similar with respect to content. These pairs of target images represented specific subjects (e.g., a dog) with either positive (e.g., a friendly dog) or negative (e.g., an aggressive dog) valence.

One class of priming stimuli for later subliminal presentation was created for all trials. Each single priming stimulus comprised two matched, overlaid target images. Three different versions of picture overlay were designed and used in each priming trial, resulting in a three-time prime presentation within a trial. The first prime presented within a trial was designed in such a way that the positive and negative stimuli were arranged with equal emphasis (50/50). Therefore, the first prime represented a homogenous mixture of both matched target images. In the second prime presentation, the positive share representing the positive target was displayed more distinctly than the negative share (60/40), and in the third prime presentation within that trial, this distinction was intensified (70/30). The positive image became increasingly dominant during the subliminal priming sequence and was expected to be more strongly activated in the perceiver's unconscious mind. This should mimic the evolution of a desire for a positive image out of an originally equal superposition of positive and negative pairs within participants' unconscious minds. The positive priming procedure applied was intended to support the participants' intentions to perceive positive target images at the end of each trial. This priming technique was successfully used by Dechamps et al. (2021, Study 1).

Since 20 matched target pairs existed, the resulting number of corresponding priming stimuli was 20. To ensure subliminality, primes were accompanied by forward and backward masks comprising scrambled and indefinable versions of each prime. These masks preceding and following the primes were generated by dividing the 50/50 priming image into a 20×16 block grid and randomly shuffling these blocks in both the horizontal and vertical positions. For the resulting scrambled versions of the priming images, the local image information remained the same, but the images' meaningful content was distorted. Using such scrambled versions of the original stimuli as masks optimizes the masking process and is a standard procedure in subliminal priming (Huang et al., 2019). Each priming stimulus version (50/50; 60/40; 70/30) was presented

along with its masks during a given trial before the target display. The target was then randomly selected by a quantum-based RNG (qRNG) from the pair of targets from which the corresponding prime stimuli were created.

Generation of Quantum Randomness

During each trial, after the priming sequence, a qRNG was used to determine whether the positive or negative image from the trial set was presented. To achieve this, a Quantis qRNG by ID Quantique was connected to the web server. This device generates two equally likely superposed quantum states by sending photons through a semi-conductive mirror-like prism. Upon measurement, only one of the two states can be observed and translated into either a 0 or a 1 bit. Owing to the random nature of quantum state reduction, a truly unpredictable result is generated. The Quantis qRNG passed all major validation tests of randomness (Turiel, 2007). The device was connected directly to the server via a USB and generated a random bit for each trial upon completion of the priming sequence and immediately before the target stimulus display, thereby working without a buffer. Care was also taken to ensure that each participant received an individual bit.

Procedure

The polling company Kantar (www.kantar.com) issued the invitation to participate in the study via email to their pool of professional clients. The exclusion criterion for this study was that participants had not participated in a previous experiment using this paradigm. Participants were advised to ensure an undisturbed environment before starting the survey. They were asked for basic demographic information and after activating their browser's full-screen mode, they were given written instructions for the task. They were advised that over the course of the experiment they would see repeated flickering visual stimuli as well as positive and negative images and that these stimuli should be watched passively. They were reminded that they could stop the experiment at any time. Prime and image presentations commenced after the participants had acknowledged the instructions and consented to participation.

Each participant viewed a total of 40 trials and every target pair was selected twice and shuffled into a unique order. Subsequently, a software randomizer (pseudoRNG) randomly selected 20 out of all 40 trials to be randomly assigned to the experimental (C_{reduced}) and control (C_{max}) conditions, respectively.

During each trial, a fixation cross was first presented in the center of the screen (1200 ms) to direct the participants' attention toward this location. Next, in the priming sequence, various combinations of the two images that corresponded to the respective target pair of a given trial were used as prime stimuli. The 50/50 mixture prime stimulus was displayed for 55 ms and was accompanied by a corresponding forward mask (110 ms) and a backward mask (110 ms) to ensure subliminal presentation. The second prime presentation (55ms) was a 60/40 mixture in which the positive target image was more visible, and the third prime presentation (55ms) within this sequence was a 70/30 mixture of this kind, both also accompanied by forward and backward masks. A 1000 ms-long gap showing a black screen was displayed after each prime presentation. In each trial, after the priming procedure was displayed, the qRNG was activated to provide an individual random bit that determined whether the positive or negative target stimulus from a given matched pair would be presented. Depending on the trial's condition, this random bit was stored to memory (C_{\max}) or added to a temporary counter (C_{reduced}). The selected target picture was presented for 1000 ms, followed by a black inter-trial interval for another 1200 ms until the next trial began. After 24 trials, participants were asked to click a button labeled continue to indicate their presence and alertness toward the experiment. Data were excluded if participants did not click the button within 10 seconds. After all 40 trials were completed, the actual number of positive images chosen by the qRNG in each condition was displayed to the participant. A heading above these numbers said, "You will see two numbers after A and B. Please watch these numbers carefully." Below this instruction, a text field with two lines, one below the other was presented. The number of positive images that the individual saw in the control condition (C_{\max}) was presented after "A" in the first line and the number of positive images that the individual saw in the experimental condition (C_{reduced}) was presented after "B" in the second line. For example:

A: 9

B: 12

These numbers reflect the objective micro-PK data in the respective conditions. The numbers were presented until the participant pressed a next button, displayed below the numbers. No explicit instruction to recall the numbers later was issued; that is, an incidental learning task was used here. After this, participants were asked to rate six different statements concerning perceived luckiness, which took around 30–90 seconds, depending on the individual's response speed. The perceived luckiness scale served simply as a filler task and will not be analyzed further here. Next, a recall task was presented, introduced by the statement: "Which numbers did you previously see after A and B? Please type in the numbers even if you are not sure whether they are correct!"

A: _____

B: _____

The recalled number after "A" was the subjective number of positive images for the control condition (C_{\max}) and that after "B" was the subjective number of positive images for the experimental condition (C_{reduced}), and were based on the participants' subjective memory performance. After the memory responses were given, participants were thanked for their participation. Since the temporary counter was not saved to the results file, for C_{reduced} , only subjective memory data for the number of positive images were available (C_{reduced} -subjective), whereas for C_{\max} , both data types—subjective memory (C_{\max} -subjective) and objective, computer-stored data (C_{\max} -objective)—were available, resulting in three dependent variables for final analyses.

Design

The study employed a within-subjects design with two conditions: an experimental condition (C_{reduced}), in which the objective data (i.e., the computer-based count of positive target images) used to assess the micro-PK effect were not recorded to a result file, and only subjective recall data of the number of positive target images were available as dependent variable; and a control condition (C_{\max}), in which both objective and subjective data of the micro-PK effect were available.

Results

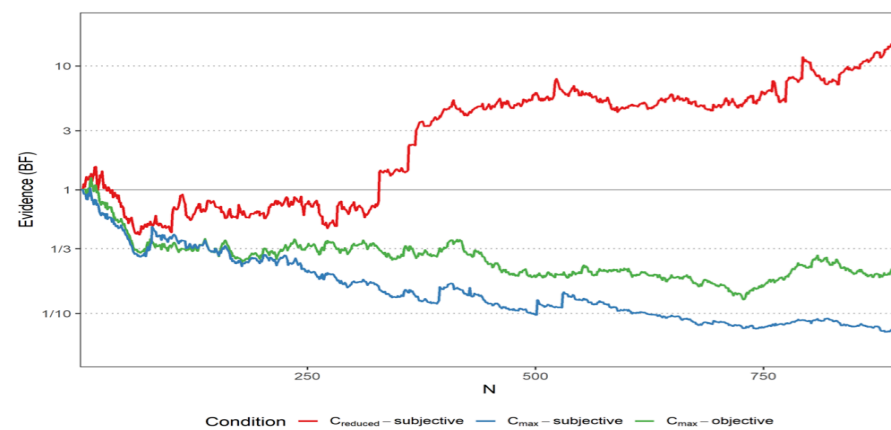
In the following analyses the recalled mean number of positive pictures (subjective scores) in both conditions and the computer-stored (objective score) mean number of positive pictures in the C_{\max} condition were

tested separately against chance occurrence. As specified in the pre-registration, three separate Bayesian one-sample t -tests (one-tailed) were performed: (a) to test whether the recalled mean number of positive images (C_{reduced} -subjective) was higher than expected by chance in the C_{reduced} condition and (b) to test whether the recalled (C_{max} -subjective) and objective (C_{max} -objective) mean numbers of positive images were higher than expected by chance in the C_{max} condition. We had predicted strong evidence for micro-PK in the C_{reduced} -subjective variable and null effects in both C_{max} -variables. The mean score expected to occur by chance was 10 positive images (out of 20 possible) on average for each dependent variable. Out of all 898 participants, 886 indicated a recalled number within the C_{max} condition and 884 did so for the C_{reduced} condition.

For the C_{reduced} -subjective variable, the Bayesian t -test (one-tailed, $N = 884$) revealed a final $BF_{10} = 17.14$, indicating strong evidence in support of H_1 . The mean score of positive images recalled in this condition was $M = 10.58$ ($SD = 6.37$). For the C_{max} -subjective variable, the Bayesian t -test (one-tailed, $N = 886$) yielded a final $BF_{01} = 13.14$, indicating strong evidence for H_0 ($M = 9.80$, $SD = 2.89$). For the C_{max} -objective variable, the Bayesian t -test (one-tailed, $N = 898$) yielded a final $BF_{01} = 4.18$, indicating moderate evidence for H_0 ($M = 9.99$, $SD = 2.17$). Figure 4 shows the sequential Bayesian analyses for the three t -tests separately for each dependent variable. While the BF of the C_{reduced} -subjective variable hit the pre-specified stopping rule of $BF_{10} > 10$, the BFs of the C_{max} dependent variables showed linear trends for null effects, since the accumulated evidence increasingly supported the null hypothesis, yielding moderate and strong evidence, respectively.

Figure 4

Sequential Bayes Factors



The correlation between C_{max} -subjective and C_{max} -objective was calculated to assess the recall performance's validity. The Bravais-Pearson correlation revealed an $r(884) = .69$ indicating that recall performance was sufficiently but—as expected—not completely accurate. The difference between the subjective ($M = 9.80$) and objective ($M = 9.99$) values in the C_{max} condition is significant, $t(885) = 2.77$, $p = .006$, suggesting that participants recalled lower scores than those actually presented.

Additionally, we analyzed the micro-PK data for gender differences (e.g., Jahn et al., 1997; Mossbridge & Radin, 2021). In these exploratory analyses, no significant effects were found with Bayesian independent-sample t -tests (two-tailed; uninformed prior $r = 0.1$, i.e., $\delta \sim \text{Cauchy}[0, .1]$) in any of the three dependent variables: all BF_{10} found were between .48 and .64, indicating anecdotal evidence for H_0 . Frequentist independent-sample t -tests revealed no significant gender effects, all t s < 1.13 (C_{reduced} -subjective: males: $M = 10.47$, $SD = 6.00$; females: $M = 10.74$, $SD = 6.80$; C_{max} -subjective: males: $M = 9.70$, $SD = 3.01$; females: $M = 9.92$, $SD = 2.74$; and C_{max} -objective: males: $M = 9.91$, $SD = 2.23$; females: $M = 10.08$, $SD = 2.11$).

Analysis of the Results and Eraser Approach

At first glance, the results match our predictions. In the C_{reduced} condition, strong evidence for a recall effect of more positive images than expected by chance was found. Moreover, in line with our expectations, no substantial positive deviation from chance was observed in the C_{max} condition on either the subjective or objective data level. This data pattern supports our proposition according to which the micro-PK effect may be a consequence of intentional observer effects based on a subjective reality whose influence can be revealed when scientific objectivity—and thus the parameter confirmation (C) in the $I_p = N * C$ equation—is reduced. This fits with Lucadou and Zahradnik's (2004) proposition that reducing the quality of documenting a psi effect might favor the occurrence of such effects. Subjective data about micro-PK outcomes are of lower scientific quality than objective data (computer-stored micro-PK data), allowing effect documentation with C_{reduced} -subjective data only. When C is maximized, quantum randomness, as predicted by standard quantum mechanics, was found.



However, this interpretation is not fully persuasive, since a confound was detected in the design after data collection and analysis. C_{\max} -subjective was continuously presented and recalled after “A: ___” and C_{reduced} -subjective after “B: ___” in the experiment. Thus, the presentation and recall order was fixed. The micro-PK effect found with the C_{reduced} -subjective variable could be alternatively explained by an order effect. Such an order effect can have different causes. Participants who must recall two numbers could on average recall a higher number when another number has been presented/recalled immediately before (so they would tend to recall a higher number associated with B than A). Such a scenario would not be unlikely if some kind of re-ordering effect had taken place during the recall phase: The participants had to keep in mind two numbers potentially in their auditory memory system, since the visual system was active during the filler task (item ratings). Upon the recall phase the individuals might have retrieved the two target numbers from their memory storage in ascending order which is a natural way of ordering numbers. In other words, they might have recalled the original numbers fairly correctly but confused the original order (A vs. B). This re-organized recall process would lead on average to lower scores being recalled after A and higher scores being recalled after B. A similar recall preference for lower compared to higher numbers was also reported by Milikowski and Elshout (1995). Such an effect could fully and alternatively explain the results reported above (we thank one reviewer for providing this alternative explanation). The fact that the mean score of the C_{\max} -subjective variable was found to be significantly below the C_{\max} -objective variable, as revealed in the exploratory analysis reported above, seems to strongly support this interpretation. In addition, one could simply argue that the letters A and/or B themselves bias recall performance in the direction found. This or similar recall order effects provide highly plausible alternative standard interpretations of the effect found. Since a standard interpretation may be preferable to a subjective reality interpretation, these data cannot be taken as evidence for our theoretical proposition. In sum, the design did not allow us to test our prediction convincingly at this point and the actual status of the experiment does not exceed the value of a pilot study.

Nevertheless, a couple of weeks later, the second author (MD) observed that although in the C_{reduced} condition, the raw data of the number of positive images stored by the computer (i.e., the objective micro-PK data in this condition) were deleted, the target images’ labels that were finally presented to the participants after

qRNG selection were still saved, although they had not been imported into the analysis. From the picture labels, the valence (positive or negative) of the target images presented could be re-assessed, which means that the objective data were not entirely erased but merely not inspected. Thus, we decided to use these data to rule out the confound described above. We set up another pre-registration at OSF (<https://osf.io/tsz5p>) in which we announced that within the C_{reduced} condition for half of the participants ($n = 449$), these labels would be deleted before inspection and for the other half ($n = 449$) the labels would now be inspected and analyzed. A pseudo-RNG was used to determine which data were to be restored and which were permanently deleted. The data within the C_{\max} condition remained untouched and were not further analyzed. Our pre-registered prediction was that within the original C_{reduced} condition a micro-PK effect on the subjective recall data should be found in the condition in which no objective data for micro-PK were available ($C_{\text{fully-erased-reduced}}$ subjective) and no micro-PK should exist in the subjective recall data of the participants ($C_{\text{restored-not-reduced}}$ subjective) for whom restored objective data ($C_{\text{restored-not-reduced}}$ objective) were also available. This procedure reflects a quantum-eraser strategy type (Kim et al., 2000).

In the following analyses the recalled mean number of positive pictures (subjective scores) in both conditions (fully-erased-reduced and restored-not reduced) and the computer-restored (objective score) mean number of positive pictures in the $C_{\text{restored-not-reduced}}$ condition were tested separately against chance occurrence. As specified in the pre-registration, three separate Bayesian one-sample *t*-tests (one-tailed) were performed: (a) to test whether the recalled mean number of positive images was higher than expected by chance in the $C_{\text{fully-erased-reduced}}$ subjective condition and (b) to test whether the recalled (subjective) and objective mean numbers of positive images were higher than expected by chance in the $C_{\text{restored-not-reduced}}$ condition. We predicted strong evidence for micro-PK in the $C_{\text{fully-erased-reduced}}$ -subjective variable and null effects in both $C_{\text{restored-not-reduced}}$ -variables. The mean score expected to occur by chance was 10 positive images (out of 20 possible) on average for each dependent variable. For the $C_{\text{fully-erased-reduced}}$ subjective variable, the Bayesian *t*-test (one-tailed, $N = 441$) revealed a final $BF_{10} = 15.47$, indicating strong evidence in support of H_1 . The mean score of the positive images recalled in this condition was $M = 11.08$, $SD = 8.31$. For the $C_{\text{restored-not-reduced}}$ subjective variable, the Bayesian *t*-test (one-tailed, $N = 443$) yielded a final $BF_{01} = 1.62$, indicating anecdotal evidence for H_0 . For the $C_{\text{restored-not-reduced}}$ objective vari-

able, the Bayesian t -test (one-tailed, $N = 449$) yielded a final $BF_{01} = 2.67$, indicating anecdotal evidence for H_0 (see Table 1 for an overview). Figure 5 shows the sequential Bayesian analyses for the three t -tests separately for each dependent variable. While the BF of the $C_{\text{fully-erased-reduced}}$ subjective variable hit the predicted $BF_{10} > 10$, the BFs of the $C_{\text{restored-not-reduced}}$ dependent variables showed linear trends for null effects, although only anecdotal evidence was found.

Figure 5

Sequential Bayes Factors



In addition, the correlation between $C_{\text{restored-not-reduced}}$ subjective and $C_{\text{restored-not-reduced}}$ objective was calculated to assess the validity of the recall performance. The Bravais-Pearson correlation revealed an $r(441) = .64$ indicating that recall performance was sufficiently but—as expected—not completely accurate. No significant mean scores difference between subjective and objective data for the $C_{\text{restored-not-reduced}}$ condition was found, $t < -0.87$.

In repeating the exploratory gender analyses reported above, we did not find any gender differences for the $C_{\text{fully-erased-reduced}}$ condition ($BF_{10} = .52$ male: $M = 11.16$, $SD = 7.81$; female: $M = 10.98$, $SD = 8.92$) but a significant difference for the $C_{\text{restored-not-reduced}}$ subjective condition (males: $M = 9.75$, $SD = 3.07$; females: $M = 10.51$, $SD = 3.73$; $t(389.4) = 2.30$, $p = .02$; $BF_{10} = 2.7$) and a marginally significant difference for the $C_{\text{restored-not-reduced}}$ objective condition (males: $M = 9.85$, $SD = 2.12$; females: $M = 10.12$, $SD = 2.17$; $t(444) = 1.74$, $p = .08$; $BF_{10} = 1.32$). Overall, no or only anecdotal evidence for gender differences in micro-PK were found in our data. Similar but stronger gender effects in micro-PK have been reported by Jahn et al. (1997) and by Mossbridge and Radin (2021).

Finally, owing to the open answer format of the recalled numbers, some memory recalls were unrealistically high (i.e., greater than 20). These extreme scores may have driven the effect found in the $C_{\text{fully-erased-reduced}}$ subjective variable. Thus, a re-analysis of the recalled numbers was performed in which all answers greater than 20 were set to 20 (which is the highest possible number of positive images). $C_{\text{fully-erased-reduced}}$ subjective yielded a $BF_{10} = 26.94$ ($M = 10.40$; $SD = 2.83$). $C_{\text{restored-not-reduced}}$ subjective yielded a $BF_{01} = 3.18$ ($M = 9.96$; $SD = 2.74$). This analysis with outlier control was not specified in the pre-registration but served as a robustness check and revealed the same results as when the outliers were included in the data.

A re-analysis of the C_{reduced} condition when the sample was randomly split into participants for whom only subjective micro-PK data were available and individuals for whom finally, in addition to their subjective recall data, now inspected and analyzed objective, computer-stored data were available showed the predicted results. Only in the subjective data of the sub-sample for which no objective data were retrievable was evidence for a micro-PK effect found. Trends toward null effects were obtained when C was recovered and maximized. This shows that an experimental manipulation of C allowed for the appearance and disappearance of the micro-PK effect on subjective data. The subjective data of the whole sample originally showed strong evidence for micro-PK in the C_{reduced} condition. However, the effect seems to have been driven only by participants in the sub-sample for which later all objective data were entirely erased. The psi effect was absent in the sub-sample for whom the objective data were finally recovered. This finding is not a post-hoc analysis given that the sub-sample manipulation was pre-registered and performed by a pseudo-random process and thus constitutes an a priori experimental manipulation of C. Thanks to this finding, the confounding factor could also be ruled out since all subjective data analyzed here were obtained from the recall performance after “B”, and thus, the presentation and recall order has been kept constant here. There are no changes in the $C_{\text{restored-not-reduced}}$ objective condition when applying a limit to 20. All raw data and analysis scripts for the main and re-analysis can be accessed via the project’s OSF repository at <https://osf.io/nveaq/files>

Table 1*Mean Values and t-Test Results of All Subsamples*

Subsample	<i>N</i>	<i>M</i> (SD)	BF ₁₀ (BF ₀₁)
Original analysis			
C _{reduced} -subjective	884	10.58 (6.37)	17.14 (0.06)
C _{max} -subjective	886	9.80 (2.89)	0.08 (13.14)
C _{max} -objective	898	9.99 (2.17)	0.24 (4.18)
Eraser analysis			
C _{fully-erased-reduced} -subjective	441	11.08 (8.31)	15.47 (0.06)
C _{restored-not-reduced} -subjective	443	10.08 (3.42)	0.62 (1.62)
C _{restored-not-reduced} -objective	449	10.00 (2.15)	0.37 (2.67)
Eraser analysis: outlier limit set to 20			
C _{fully-erased-reduced} -subjective	441	10.40 (2.83)	26.94 (0.04)
C _{restored-not-reduced} -subjective	443	9.96 (2.74)	0.31 (3.18)

Note. Since the Bayes Factor represents a symmetrical ratio of evidence for the concurring hypotheses, BF₀₁ is always 1/BF₁₀.

Discussion

This study aimed to test the existence of a subjective reality from which micro-PK effects arise. Subjective reality, in contrast to subjective and objective realities, is a realm in which pragmatic information ($I_p > 0$) and where intentional agency ($N > 0$)—for example, in the form of psi effects—might be found. Maximizing objectivity in science (C_{max}) is believed to override any micro-PK effects, and thus a strategy of reducing C was implemented in an experimental scenario to facilitate the observation of micro-PK outcomes following principles proposed by Lucadou and Zahradnik (2004).

Strong evidence for micro-PK was found on subjective data when objective data were erased. On average, participants recalled numbers associated with more positive images than expected by chance in the $C_{reduced}$ condition when the corresponding objective data were not inspected. The recalled numbers correspond to what would be expected by chance when objective data were additionally analyzed in the C_{max} condition. Although this finding was initially questioned by a confound concerning presentation/recall order, an additional pre-registered a priori manipulation of C confirmed this main finding. In circumstances in which previously un-inspected objective data concerning the number of positive target images presented to the individuals were per-

manently erased from the result files, micro-PK effects were again obtained with subjective memory data. Thus, an experimental reduction in the data's scientific objectivity led to positive micro-PK results. The subjective data are just an indirect indicator of the real picture presentations, and their measurement quality is limited owing to memory biases (this aspect served the purpose of reducing C). However, subjective data correlate substantially with objective data sets, which demonstrates that they are a reliable approximation of the objective rate of positive images. Additionally, any analysis of the objective data confirmed a null effect, with varying degrees of Bayesian evidence supporting the predictions made by standard quantum mechanics (Born, 1926) in a C_{max} measurement context.

In the past, the frequently reported decline effects across studies in the micro-PK research field have been attributed to an increase in confirmation when original findings were replicated (e.g., Bierman, 2001; Lucadou, 2015) and to the reduced N (i.e., diluted intentional impact) at work in later performed replication studies. This interpretation is nevertheless vulnerable to alternative interpretations. For example, the decline effect could also indicate false positives within the original data, or later studies' quality might be higher than those performed earlier, even if some of these objections have been ruled out (Bierman, 2001). The study presented here tested the MPI's conjectures by experimentally manipulating C . In this way, any alternative explanations for null effects may be ruled out. The results of our data suggest that micro-PK effects depend directly on C , supporting the explanation for the elusiveness of micro-PK effects offered by von Lucadou and colleagues.

Although an emphasis on manipulating C was made in the study presented here, the manipulation of N was kind of neglected, which might be considered a downside of this study. The intentional goal for reality construction used here was the participants' preference for positive pictures supported by subliminal priming. Another, maybe better option would have been to explicitly instruct the participants to approach positive picture presentations during trial observations. Such an implementation of a more active intentional goal might have been a better manipulation of N instead of the more passively present positivity preference applied here. Past micro-PK research successfully used such active intention inductions (e.g., Jahn et al., 1997) and a recent high-power micro-PK study using an active goal induction reported by Mossbridge and Radin (2021) found evidence for micro-PK in a first data set that could be replicated in a pre-registered analysis of micro-PK data in a second



dataset. This finding might indicate that a strengthening of participants' intentions in terms of more actively induced goals could produce replicable effects in micro-PK and overcome the detrimental effects of C. Future research in micro-PK should further explore this stabilizing effect by emphasizing intention (N) possibly in addition to variations of C. As outlined above, our reason to stay with Dechamps et al. (2021, Study 1) original design was to ensure C_{\max} from the beginning of our new data collection, but admittedly this study carried the disadvantage of only imperfectly manipulating N. However, the manipulation of N, albeit potentially suboptimal in our study, successfully served its purpose to induce a goal-dependent creation of positive picture realities as documented by the results obtained from the $C_{\text{fully-erased-reduced}}$ subjective recall data. The exploratory analyses revealed some anecdotal evidence for gender differences in some of our dependent variables in the eraser experiment. Although this tentatively confirmed similar findings in micro-PK research reported by Jahn et al. (1997; see also e.g., Mossbridge & Radin, 2021), the analyses performed here were only exploratory in nature and did not reach a convincing level of empirical evidence. A theoretical interpretation about the role of gender within our data is thus premature and needs to be replicated in future research. Nevertheless, our results partially confirmed Mossbridge and Radin's (2021) argument that gender effects might play a relevant role in micro-PK research.

The study presented here tested the impact of intentional observation on quantum-based stochastic outcomes under experimental variations of the applied measures' objectivity. As predicted, an intentionally congruent bias in quantum-based outcomes was observed using subjective recall data when simultaneously objective data were not inspected and finally erased (i.e., confirmation was reduced). Quantum randomness was confirmed in a maximum objective data collection context for both stored and recalled data. These results indicate that I_p was transferred during trial observation. Since neither the objective quantum and classical physical world nor the world of subjective experience contain $I_p > 0$, the results can only be explained by a third form of reality that serves as an interface between the two.

The approach developed in this research when replicated in a future study might at some point suggest the existence of a subjective reality that may be located between the subjective-objective distinction. This implies that it can only be tested with a reduced-objective design but still in a quantitative manner and is thus not

merely a matter of subjective beliefs. In this regard, the natural laws obtained from scientific research in classical and quantum physics—which exclude intentional agency (Schrödinger, 1958)—may be considered a special case that implies certain restrictions to the measurement process, with the MI defined as a channel that passively registers the measurement outcome. We may speculate that the idea that our objective world, at its deepest level, might be caused by random events is merely a consequence of maximizing the confirmation procedures in science (e.g., direct replication, separation of MI and MO, etc.). Thus, it seems that our world might be guided only by randomness when viewed through the lens of objective science. In this case, the big bang, evolution, and everything that exists are primarily based on initially random processes that are subsequently shaped by the laws of nature. The potential influence of intentional agency is excluded from this world owing to a narrow definition of measurement considered to be passive observation (Jahn & Dunne, 1997). The existence of a subjective reality, as tentatively documented here, renders the influence of intentional agency in the creation, or emergence, of reality a plausible alternative possibility. A worldview based on either deterministic laws or intentional creation is thus a matter of how measurement is conceptualized. Moreover, even in pure physics experiments, the data are finally observed by human beings, and thus a C_{\max} approach might be merely an idealistic assumption. Future research should endeavor to replicate the findings reported herein and explore other designs to study the influence of a reduction of C on objective and subjective data. The confirmation of such an effect might then have implications for our worldview that transcend the limited domain of psi research. In addition, the operationalization of N and C in the present study is just a first attempt towards an understanding of these concepts and their effects on micro-PK. Future research should explore additional factors that contribute to N and C to allow a more precise definition of these concepts that goes beyond the rather superficial definitions originally provided by von Weizsäcker (1974). Our research should be considered as just a first step in this direction. Finally, we would like to emphasize that our explanatory framework is not the only plausible explanation for micro-PK effects and their decline (e.g., May et al., 1995) and our study was not planned as a decisive experiment to rule out alternative explanations. It rather provides evidence for the role of confirmation (C) in micro-PK and should be considered as one among many other theories explaining micro-PK.

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The Ethics of Belief in Paranormal Phenomena¹

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Abstract: The philosophical school of Evidentialism holds that people should form, amend, and relinquish a belief wholly in accordance with the available evidence for that belief. This paper reviews the extent to which believers in paranormal phenomena respect Evidentialism’s so-called “ethics of belief.” The analysis focuses on several common violations of evidentialist principles, namely, those pertaining to belief formation as a moral issue, belief inflexibility, belief inconsistency, confirmation bias, and disconfirmation effects. Despite some gaps and methodological shortcomings in the available data, the empirical literature documents an association between paranormal beliefs and a broad lack of sympathy with evidentialist ethics, although the effect sizes of these relations typically are small. The possible basis of this characteristic is briefly explored.

Keywords: paranormal belief, Evidentialism, belief inflexibility, belief inconsistency, confirmation bias, disconfirmation effects

Highlights

- Evidentialism holds that the formation of a belief must be based wholly on the evidence in its support.
- Common violations of evidentialist principles concern belief formation as a moral issue, belief inflexibility, belief inconsistency, confirmation bias, and disconfirmation effects.
- Paranormal believers in the general population are relatively prone to each of these violations.
- A need for a sense of meaning in or mastery over life events may play a major role in believers’ relative subversion of evidentialist ideals.

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Belief is a moral act, for which the believer is to be held responsible.

British philosopher Herbert Arthur Hodges (1953, p. 65)

This paper explores aspects of the deliberation in which people may engage when forming and maintaining their beliefs in paranormal phenomena. Specifically, the analysis bears on a set of interrelated ethical and epistemological issues that collectively are dubbed by philosophers as “the ethics of belief” (Matheson & Vitz, 2014), that is, matters concerning the fundamental question of whether there are “norms of some sort governing our habits of belief-formation, belief-maintenance, and belief-relinquishment” (Chignell, 2018, p. 1).

Basic elements of the ethics of belief have been expounded by prominent philosophers across the ages, from ancient Greece to René Descartes and John Locke in the 17th Century and David Hume in the 18th Century, but among the general populace an appreciation of these issues was sparked principally by William Clifford in an article he wrote in 1877. Working in Victorian England, Clifford was a respected Cambridge mathematician and philosopher, and, most pertinently, a highly effective popularizer of science for general readers (Chisholm, 2002). In his essay “The Ethics of Belief” Clifford (1877) formulated his now-famous dictum on doxastic responsibility: “it is wrong always, everywhere, and for anyone, to believe anything upon insufficient evidence” (p. 295). The formation of a belief therefore carries with it a moral responsibility to ensure its evidential foundations.² Indeed, Clifford went further by stressing the obligation to look diligently for relevant evidence, to remain open to new evidence that comes one’s way, and to consider the testimony offered by others. Van Inwagen (1996, p. 145) refers to this elaboration as Clifford’s “other principle” under which “it is wrong always, everywhere, and for anyone to ignore evidence that is relevant to his beliefs, or to dismiss relevant evidence in a facile way”. In short, endorsement of a belief is morally justified if and only if one has earnestly sought, identified, and rationally analyzed confirmatory evidence with due reference to competing views. Clifford’s thesis, with the primacy it gave to the role of evidence in conscientious belief formation and maintenance, became the cornerstone of the philosophy of Evidentialism (Aiken, 2015; Conee & Feldman, 2004), and his essay is now frequently anthologized.

The principle of evidentialism has nevertheless been subject to some criticism. Although Clifford’s (1877) paper made no explicit reference to religious beliefs it was immediately portrayed by clerics and theologians as an unacceptably provocative attack on religious dogma (Small, 2004). Perhaps this response was not surprising, given that religious beliefs may often be a matter of pure faith or intuition. Even in more contemporary times DePoe (2016, p. 1) certainly had some grounds for his concern that in the context of religious epistemology, “anti-evidentialism seems to be all the rage these days.” On the other hand, several researchers (e.g., Ahmad, 2020; Hendry, 2019; Van Leeuwen, 2014) have argued that when used in a religious context the word “belief” differs in many key respects from its meaning in other contexts and, indeed, strictly speaking religious tenets might not constitute beliefs at all. The merit of evidentialism therefore should be considered in a more general context.

After Clifford’s premature death in 1879 the influential American psychologist William James (1897) argued that there are some special circumstances in which it is reasonable and even necessary to form a belief despite a lack of sufficient evidence; that is, if we do have a choice in what we believe, we may justifiably decide between options even when the choice cannot be made on evidential grounds (This assumption by James has been vigorously debated by philosophers, most recently under the rubrics of *doxastic voluntarism* and *doxastic involuntarism*. Implications of these assumptions for Clifford’s thesis are reviewed by Lindner (2020) and Oya (2018). Further, one may choose to endorse a belief largely for pragmatic reasons (see also Marušić, 2011; Ohlsson, 2013); for example, some people’s belief in God may be based on a hopeful assumption that this belief will exempt them from eternal damnation, thereby making this belief seem a prudent one for them to embrace (Jordan, 2006). Certainly, the possibility of non-evidential grounds for a belief may serve as a caution against an off-hand dismissal of a person as epistemically “blameworthy” for endorsing a belief in this manner; there may well be other pertinent considerations (see also Bortolotti et al., 2016; Bortolotti & Miyazono, 2016). Again, other commentators have quibbled over the sweeping universality of Clifford’s principles of moralized rationality and how “evidence”, “support”, and “acceptance” may legitimately be defined and measured in this context (e.g., Bandyopadhyay et al., 2016; Dougherty, 2011; Levi, 2008; McCormick, 2014).



Belief Formation as a Moral Issue

Notwithstanding these qualifications the general doctrine of evidentialism or morally responsible belief continues to be vigorously advocated by many philosophers (e.g., Cloos, 2015; Conee & Feldman, 2004; Way, 2016; Wood, 2008; Zamulinski, 2004). At the same time there are some people in the general population who show, as Cassam (2018, p. 1) observed, “a casual lack of concern about whether [their] beliefs have any basis in reality or are adequately supported by the best available evidence”. Indeed, irrespective of the degree to which evidentialism is broadly endorsed (at least in principle) by the public (Garrett & Weeks, 2017; Ståhl et al., 2016), people’s violation of the ethics of belief appears to be commonplace (Gilovich et al., 2002; Oechssler et al., 2009). In very general terms, therefore, it is reasonable to ask if there are grounds for suspecting that as a broad group, people who believe in paranormal phenomena may be relatively susceptible to such violations. In this context it is noteworthy that several studies (e.g., Dagnall et al., 2010; Irwin, 2003) have documented a relation between paranormal belief and deficiencies in reality testing. As the formation and maintenance of evidence-based beliefs would be critically reliant on effective reality testing these findings may be indicative of some violations of the ethics of belief among paranormal believers. The viability of this inference at least warrants more specific scrutiny in relation to the available empirical literature.

Some of the common violations of the ethics of belief will now be described with particular reference to belief in paranormal phenomena among the general population. The instances of violation addressed here concern belief formation as a moral issue, belief inflexibility, belief inconsistency, confirmation bias, and disconfirmation effects; each of these is discussed below in turn. Note that this list should not be regarded as a comprehensive taxonomy of violations of evidentialism: the list certainly is neither systematic nor exhaustive, and the instances nominated here are not mutually exclusive or otherwise distinct from one another. Rather, the focus here is on instances of these violations that have been delineated, operationalized, and subjected to empirical research by behavioral scientists. The set of “paranormal believers” is heterogeneous, so we cannot generalize. In some respects, heterogeneity is probably the case, but no studies of evidentialist violations have been undertaken to compare possible subtypes of paranormal believers. For the main part, therefore, in this paper paranormal believers are simply people in the general population who rank more highly on a standard dimensional measure of such beliefs. It is legitimate to make generalizations that apply on the whole to this group without implying that the observation must necessarily hold for every person in this group and for every subgroup.

The core element of Clifford’s (1877) dictum is that moral responsibility must be exercised in the formation and maintenance of beliefs. Although at first glance it may seem quaint and somewhat passé to describe the generation of beliefs in these terms, moral considerations (as broadly conceived) are now being recognized to have a far-reaching influence on people’s mentation and behavior (e.g., Forsyth, 2019; Gray & Graham, 2018). This is specifically the case for the psychology of belief: the recent work of Ståhl and his colleagues (Ståhl et al., 2016; Ståhl & van Prooijen, 2018) has both operationalized and documented the general attitude that reliance on evidence and logic in the formation and evaluation of beliefs is a *moral virtue*. A disdain for these moral considerations would indeed constitute a fundamental violation of Cliffordian ethics of belief.

One way in which this violation could be instantiated is with respect to one’s attitude to science. Given that science is the principal social institution that promulgates the necessity of an appeal to empirical data in the search for truth, people who do not view evidential grounds for a belief as a moral obligation may be relatively unenthusiastic about the values of science. Most of the general community claims to take an interest in science and to appreciate the contributions science has made to the quality of modern life (Castell et al., 2014), but there is also a substantial group of people who are disinterested in science, who distrust science, and who express concern about (actual or potential) negative effects of science and technology on society (Gauchat, 2012; Rutjens et al., 2018; Swanson, 2013). It is therefore germane to consider the general attitude to science among paranormal believers.

Investigation of a relation between paranormal beliefs and the extent of the person’s scientific *education* has yielded mixed results; for a discussion see Manza et al. (2010) and Wang et al. (2011). Be this as it may, there are more direct indications that believers acknowledge the values of science less strongly than do skeptics. Clobert and Saroglou (2015) report that the intensity of paranormal beliefs is positively related to (a single-item index of) distrust of science (in two European countries $r = .12$ and $.23, p < .001$). Using more comprehensive indices, Irwin et al. (2015) found that paranormal belief correlates negatively with an acceptance of the values of science ($r = -.63, p < .001$), and this relation was replicated by Irwin et al. (2016; $\rho = -.55, p < .001$). Similarly, Fasce and Picó (2019) report that paranormal beliefs relate negatively to trust in science ($r = -.34, p <$

.001). These findings on paranormal believers' relatively weak endorsement of scientific values are consistent with the view that believers are not strong supporters of evidentialism. The data admittedly are not conclusive: although evidentialism is a central component of the values of science the latter do include additional ideals.

To date only two studies have documented the direct relation between the intensity of paranormal beliefs and evidentialism as a moral virtue. In one sample Ståhl and van Prooijen (2018) found a negative relation between paranormal belief and evidentialism perceived as a moral virtue both in oneself ($r = -.14, p < .05$) and others ($r = -.19, p < .01$), although these correlations failed to reach significance in another sample ($r = -.10$ and $.04$ respectively). Using different measures, Pennycook et al. (2020) also found a negative correlation between paranormal belief and the view that one's beliefs and opinions *ought* to change according to the evidence ($r = -.22, p < .001$). These findings are consistent with a negative relation between paranormal beliefs and the acceptance of evidentialism as a moral virtue.

Belief Inflexibility

In most situations a person has a choice in how he or she will behave, but some people in some contexts may not be very flexible in this regard. As Martin and Rubin (1995, p. 623) explain, *cognitive flexibility* entails the "person's (a) awareness that in any given situation there are options and alternatives available, (b) willingness to be flexible and adapt to the situation, and (c) self-efficacy in being flexible."

At the broadest of levels virtually any violation of the ethics of belief may be deemed to be indicative of a lack of cognitive flexibility. By neglecting substantiating evidence, one therefore may be relatively inflexible in the formation of a belief, in the maintenance of existing beliefs, and in relinquishing or revising an existing belief. The term *belief inflexibility* may be used to denote these collective effects. Much of the past research on belief inflexibility has been undertaken under the rubric of "dogmatism" or closed-mindedness, a personality style marked by an unyielding certainty in one's beliefs and by a lack of open-mindedness. Thus, extreme dogmatists are portrayed as showing "defensive cognitive closure" or an implacable resistance to changing their beliefs, even in the face of clearly discrediting information; a rigid unwillingness to suspend judgment; an impoverished ability to view an issue from another person's perspective; an intolerance of ambiguity and a high

need for closure; a habit of asserting opinions as truths; an intolerance of contradiction; a general lack of awareness of the doctrinaire manner in which they endorse their beliefs; and an inclination to appeal to authority rather than evidence *per se* in order to justify their beliefs (e.g., Davies, 1993; Friedman & Jack, 2018; Johnson, 2009; Vacchiano et al., 1969).

At the same time, it must be stressed that dogmatism or closed-mindedness is a trait-like construct and may be found in varying degrees across the whole population. There are now several questionnaire measures of dogmatic tendencies. A historically influential scale was constructed by Rokeach (1960) but is now deemed to have unacceptable psychometric shortcomings such as poor internal consistency, uncertain factorial structure, omission of negatively worded items, outdated wording, an intrinsic nonlinearity, a vulnerability to response sets, and a possible confound with political conservatism (Altmeyer, 1996; Johnson, 2009; Shearman & Levine, 2006). These problems appear to have inhibited research on the topic in the 1980s and 1990s, but the subsequent construction of alternative scales has fostered renewed interest in dogmatism and closed-mindedness.

A few studies have investigated the relation between dogmatism and belief in paranormal phenomena. Two studies report a higher mean level of dogmatism among paranormal believers than skeptics (Alcock & Otis, 1980; de Barbenza & de Vila, 1989), and one study reported a small positive correlation ($r = .19, p < .05$) between dogmatism and one measure of paranormal belief but not with another ($r = .05$; Thalbourne et al., 1995). In two other studies, however, these relations were not significant (Nanko, 1987; Tobacyk & Milford, 1983). Further, these investigations used either Rokeach's (1960) dogmatism questionnaire or a shortened version of it (Troidahl & Powell, 1965); as noted above, there are some psychometric concerns over this measure of dogmatism. Nevertheless, more recently Čavojová et al. (2019) reported a correlation of $.13 (p < .05)$ between paranormal belief and a revised measure of dogmatism. Similarly, on a measure of open-minded thinking both Napola (2015; $F(3, 1659) = 55.36, p < .001$) and Rizeq et al. (2020; $r = -.44, p < .05$) found that paranormal believers performed more poorly than skeptics.

In addition to the research using questionnaire measures of dogmatism, a few experimental studies (Jones & Russell, 1980; Russell & Jones, 1980; Sparks & Pellechia, 1997) have indicated that paranormal be-

lievers may be relatively resistant to dissuasion from their beliefs, a behavior interpretable as dogmatic. Discussion of some of these studies is undertaken below in the context of disconfirmation effects.

In short, some research findings are consistent with the notion that paranormal believers are relatively prone to belief inflexibility, suggesting that believers as a group may lack sufficient respect for the evidentialists' stress on the primary importance of evidence for the formation and the revision of one's beliefs.

Belief Inconsistency

Another type of violation of the ethics of belief concerns belief inconsistency. A lack of due attention to evidential considerations may well lead to the formation and subsequent maintenance of beliefs that to some extent contradict one another. One may aver, for example, the necessity of honesty in close relationships and at the same time deem it appropriate to lie to a companion when an awkward situation arises. People are usually unaware of this tendency until it is pointed out to them (Nordby, 2003). Belief inconsistency is known colloquially as “doublethink,” a term coined by the novelist George Orwell (1949) in his dystopian tale *Nineteen Eighty-Four*. More formally the construct is termed *schizodoxia* (Musacchio, 2012) or *incoherency of beliefs* (BonJour, 1985). Many commentators scorn the presence of belief inconsistency (e.g., Gawronski & Brannon, 2019; Lehrer, 1990) because it flies in the face of an expectation of people to be rational (Bortollotti, 2003). Kurzban (2010), on the other hand, argues that belief inconsistency is a normal and probably universal feature of the human condition. Similarly, Smith (2016, p. 16) asserts, “no one holds perfectly consistent beliefs. We are all quite adept at finding ways to make incompatible ideas sit contiguously.”

Brief mention may be made here of a scenario under which the concurrent endorsement of inconsistent beliefs might not be utterly irrational. There is a case for the view that at least some beliefs may be endorsed probabilistically (Bazzoni, 2017; Leitgeb, 2017), that is, with a *degree* of confidence or commitment rather than simply as “true” or “false” (so-called binary belief). In addition to outright beliefs and disbeliefs, therefore, there may be an array of intermediate “not-quite-beliefs” (Tumulty, 2012) or *partial beliefs* to which one's commitment is equivocal to some extent. Further, the (approximate) degree of belief is held to be often accessible to introspection (Dogramaci, 2016). In this case advocates of evidentialism presumably would expect an assess-

ment of evidential support for a proposition based on the balance of probabilities (Jeffrey, 1985/1992; Ramsey, 1926/1990). Nonetheless, under this probabilistic or Bayesian approach to belief representation, inconsistent beliefs could legitimately be held concurrently (Christensen, 2004), providing their subjective probabilities or degrees of confidence conform to a fundamental law of probability, namely that the sum of the probabilities of mutually exclusive events may not exceed 1 (Mlodinow, 2009). Within this constraint inconsistent beliefs may reasonably be embraced as strictly *alternative* views (Lukić et al., 2019), with each belief providing a feasible account of a given issue but with each being accorded only tentative endorsement. Be this as it may, the underlying notion of “partial belief” does raise additional conceptual complications (e.g., Eriksson & Hájek, 2007; Huber & Schmidt-Petri, 2009; Moon, 2017). For ease of exposition, we therefore continue to focus on binary belief, but the following comments on the consequences of inconsistent beliefs should apply also to any set of such beliefs for which the sum of subjective probabilities violates an axiom of probability theory by exceeding 1. Observance of this criterion may be hindered if the person's estimation of subjective probabilities is very imprecise (Elga, 2010; cf. Bradley & Steele, 2014; Schiffer, 2000). Interestingly, there is independent evidence that paranormal believers may have a relatively poor grasp of the laws of normative probability (e.g., Dagnall et al., 2016; Rogers et al., 2009).

As Geraskov (2012) has so deftly demonstrated, people's identification of beliefs as mutually contradictory can be conscious or unconscious. This observation should be borne in mind in the following context. Inconsistency between beliefs is held to evoke cognitive dissonance (Borgoni, 2014; Cooper, 2012; Festinger, 1957), a state of psychological discomfort and associated negative affect (Harmon-Jones, 2000) that will drive the person to resolve the inconsistency, whether by abandoning one of the contradictory beliefs altogether or otherwise qualifying or revising the beliefs (e.g., locating further evidence that helps to resolve the discrepancy between them, or identifying different circumstances under which the respective beliefs are appropriate; Cooper, 2012). These processes help to eliminate inconsistency between beliefs, and they do so in harmony with the ethics of belief. In some instances, however, it seems that a person may seek to reduce the level of cognitive dissonance by means that are not so heedful of the ethics of belief (Smith, 2016). For example, perhaps the person may self-deceptively downplay the importance or subjective probability of the conflicting beliefs (Boudry & Braeckman, 2011); or mentally encode the conflicting beliefs differently, thereby impeding their

direct comparison (Geschke et al., 2010; Kurzban, 2010; Sloman, 2002); or temporarily exclude one of the conflicting beliefs from active consideration (Boudry & Braeckman, 2011; Hansson, 2017); or even mount mental barriers between the beliefs (a hypothetical cognitive process variously termed compartmentalizing, encapsulating, or partitioning; Davies & Egan, 2013). Each of these cognitive processing stratagems seemingly has the objective of circumventing potential tension between conflicting propositions and thereby enhancing the systemic coherence of belief networks (Grim et al., 2017). In such cases, however, the inconsistent beliefs may co-exist relatively unchanged for some time.

In summary, violations of the ethics of belief may occur both in the initial formation of inconsistent beliefs and in the use of an avoidant strategy to bypass a consequent state of cognitive dissonance. The extent to which inconsistent beliefs persist therefore may be another indication of the occurrence of ethical violations. For this reason, it is important to have a measure of people's inclination to harbor contradictory beliefs. An impediment to research into this psychological characteristic has been the lack of a standardized measure of susceptibility to belief inconsistency, but a formative step toward this goal was taken by Rittik (2013). Rittik's questionnaire comprises 16 propositions and respondents are asked to indicate the strength of their agreement with each item on a Likert-type scale (1 = strongly agree to 4 = strongly disagree). The 16 statements comprise 8 pairs of inconsistent beliefs, so an ideally logical respondent would be expected to give complementary ratings to the members of each pair (e.g., one high and one low). The (absolute) extent of the shortfall in complementarity is summed over the 8 pairs as an index of the susceptibility to belief inconsistency. As Rittik predicted, this index correlated positively with dogmatism ($r = .53, p < .001$). This finding accords well with Rokeach's (1954) speculations on the level of belief inconsistency among dogmatists and, more importantly, it supports the validity of Rittik's approach to the measurement of susceptibility to belief inconsistency.

Seeking to build on Rittik's (2013) research by applying it to the study of belief in paranormal phenomena, Irwin et al. (2015) investigated the relation between paranormal belief and Rittik's index of belief inconsistency. Their study found the correlation to be significant for one sample ($\rho = .35, p < .001$) but null for another ($\rho = .00$). However, Cronbach's α for Rittik's scale was only .47 and .55 in the two samples used in the study; that is, the internal consistency of the item pairs was not strong. Further investigation of a relation between belief

inconsistency and the intensity of paranormal beliefs therefore warrants the construction of a measure of belief inconsistency that redresses the psychometric limitations of Rittik's (2013) questionnaire.

Such measures are currently in preparation. Petrović and Zezelj's (2021) forthcoming Doublethink Scale is a substantial improvement on Rittik's (2013) measure. Most interestingly, this scale showed a correlation of .18 ($p < .05$) with superstitiousness and .29 ($p < .05$) with the use of such practices as homeopathy and acupuncture (Marija Petrović, personal communication, August 23, 2021). Certainly, there is still a need for studies with both an improved measure of doublethink and a more comprehensive index of paranormal belief. Nonetheless, in conjunction with the findings of Irwin et al. (2015), Petrović's data provide a degree of support for the view that paranormal believers are relatively prone to endorse inconsistent beliefs, contrary to the principles of evidentialism.

Confirmation Bias

A violation of the ethics of belief may arise also with respect to the selection of evidence in support of a belief. Under a so-called *confirmation bias* people search for, interpret, or recall evidence in ways that are biased toward confirming their existing beliefs; that is, people "test" their beliefs in a cherry-picking fashion by soliciting, recalling, and assimilating mainly confirmatory information and by focusing on one possible interpretation of the evidence while ignoring alternatives (Jelalian & Miller, 1984; Nickerson, 1998). Although a confirmation bias occasionally may be defensible (e.g., in the context of a belief about impending danger, Dudley & Over, 2003; or when there are hardly any alternative beliefs, Perfors & Navarro, 2009), in most situations this strategy of selective attention appears to be a defensively-driven impediment to the on-going critical evaluation of existing beliefs (Klayman, 1995; Sleegers et al., 2019). Confirmation bias has been described as ubiquitous (Nickerson, 1998) and "the most insidious of all cognitive errors" (Hollier, 2016, p. 1), and it is usually construed as an unconscious heuristic that is inaccessible to introspection (Nickerson, 1998), although Anglin (2016) has shown that some people are aware of this bias in themselves.

A tendency toward confirmation bias in paranormal believers has been documented through various research paradigms. In an online survey, Irwin et al. (2012) administered Rassin's (2008) questionnaire measure

of confirmation bias and found it to have a small but positive correlation ($\rho = .22, p < .01$) with paranormal belief. On the other hand, Rassin's scale has scant independent psychometric documentation, and many of its constituent items appear to have more to do with impulsivity and intuition than with confirmation bias.

In experimental studies paranormal believers given information through ostensibly psychic readings (Boyce & Geller, 2002; Lawson, 2003; Roe, 1995) or horoscopes (Glickel et al., 1989; Munro & Munro, 2000; Wiseman & Smith, 2002) tended to endorse much of the information despite having been spuriously generated with no specific reference to the psychological profile of the participant. These studies document a key aspect of confirmation bias in the context of paranormal belief, namely that when evidence bearing on a paranormal belief is encountered, paranormal believers are relatively inclined to act in accordance with that established belief rather than considering other (non-paranormal) possibilities. Again, there remains a question as to whether this violation of belief ethics is relatively specific to the context of paranormal belief (Braithwaite, 2006) or, alternatively, if paranormal believers are generally susceptible to confirmation bias in forming and maintaining *any* type of belief. Consistent with the latter possibility, an experimental study by Blanco et al. (2015) found that, in comparison to paranormal skeptics, a sample of believers had a slight bias toward the interpretation of ambiguous information as supportive of an existing belief even when the context was unrelated to paranormal phenomena (viz., the effectiveness of a new medication). Nonetheless, this finding warrants replication with a wider range of non-paranormal beliefs in order to test its generality.

Of particular interest here is the possibility that paranormal skeptics also are subject to confirmation bias. Hergovich et al. (2010) found that psychologists who were skeptical of astrological claims tended to commend more highly the methodological rigor of a fictitious experimental report that described the disconfirmation of astrological hypotheses. Butzer (2020) found the same effect in academic psychologists' evaluation of a test of parapsychological hypotheses. These observations raise a potentially important methodological point. Disbelief in the paranormal is a belief and, indeed, often an ardent one (Irwin et al., 2017; Lamont et al., 2009). If violations of the ethics of belief serve in some sense to "protect" cherished beliefs (Boudry & Braeckman, 2011; Davies & Egan, 2013; Hart et al., 2009) one might expect that paranormal believers and skeptics alike would show these violations when their respective beliefs are contextually activated. As a corollary of this view, if

violations of belief ethics are indeed to be found at both extremes of the paranormal belief–disbelief continuum, the application of linear statistical analyses (correlation or linear regression) may not be the most sensitive strategy for the assessment of a relation between such violations and the intensity of paranormal beliefs. Some of these strategies for accommodating contradictory beliefs have been formulated by psychoanalysts and by logicians and other artificial-intelligence scientists who design "rational agents" for smart machines. The operation and the effectiveness of such strategies in humans may warrant stronger empirical documentation.

In summary, available data on confirmation effects in paranormal believers therefore are consistent with these people's inclination to violate Cliffordian ethics of belief, although some data also indicate the need to consider possible curvilinear relations across the continuum of belief and disbelief.

Disconfirmation Effects

Violations of the ethics of belief may occur also in how which people deal with evidence that disconfirms their beliefs. Under Clifford's (1877) analysis the search for disconfirmatory evidence is held to have crucial ethical implications: such evidence should first be energetically pursued and then, if the contrary evidence is substantiated, it should become the grounds for either abandonment or judicious revision of the associated belief. Sometimes, of course, this whole process is far from a trivial epistemological exercise (Lavigne et al., 2015). As Anomaly (2017, p. 287) observes, "Since we have goals other than increasing our understanding of the world, we constantly face hard choices about the kind and quantity of information to gather, how long we should spend sifting through it, and the practical use to which we might put it." Perhaps it is not surprising, therefore, that people may often be disinclined to process disconfirmatory evidence in a wholly rigorous manner, notwithstanding the admonitions of the advocates of Evidentialism.

The psychological consequences of the disconfirmation of beliefs or expectations have long interested social scientists. Some of the basic findings of this body of research are that when people are motivated by a self-serving defensiveness rather than a need for accuracy (Hart et al., 2009) they appear to be unable to assess evidence independently of their prior beliefs and preferences (Bastardi et al., 2011; Lord et al., 1979), and they scrutinize incompatible evidence longer, examine it more diffusely in the search for a possible refutation, dero-



gate its source, and generally judge it to be weaker than evidence compatible with their existing beliefs (Bastardi et al., 2011; Ditto & Lopez, 1992; Edwards & Smith, 1996). At the other extreme, people may be motivated to avoid exposure to potentially disconfirmatory evidence (Shepherd & Kay, 2012). These defensive biases seem to be relatively independent of cognitive sophistication or ability (Stanovich et al., 2013; West et al., 2012) and indeed, they may be relatively primitive cognitive mechanisms; it is in this sense that Boudry (2018, p. 21) suggests that “beliefs have evolved to become resilient and immune to refutation, which does not (necessarily) involve deliberate deceit or hypocrisy on the part of believers.” In any event these biases against disconfirmation would allow the on-going maintenance of tenuous beliefs, shielding them from revision or relinquishment.

In the specific context of the disconfirmation of paranormal or related beliefs, one of the seminal studies in this field is Festinger et al.’s (1956) case study, *When Prophecy Fails*, which documented the disconfirmation of a paranormal belief system. In 1954 a small doomsday sect was established in the USA. The group believed the American West Coast would be inundated by a huge flood on December 21, 1955, but sect members would be rescued by “superior beings” who would arrive in a flying saucer. In due course many members of the group abandoned their employment or education and gave away their possessions in expectation of their imminent departure in the flying saucer. Festinger and his colleagues infiltrated the group to observe the effects on the cult members when the apocalyptic prophecy inevitably failed. After some initial bewilderment the group decided that the predicted flood did not occur because God had witnessed the group’s righteousness and therefore had decided to spare the residents of the West Coast from annihilation. Rather than abandoning their cult beliefs and disbanding after the failure of the prophecy, members of the group therefore became even more enthusiastic for their movement’s teachings and renewed their fervent efforts to proselytize or communicate their “sacred knowledge” to others. According to Festinger et al. (1956), key factors in maintaining a belief in the face of disconfirmation were the great strength of the initial belief, the availability of a means to rationalize (or discredit) the disconfirmation, and the social support of other people who had shared the disconfirmatory experience. Some subsequent “failure of prophecy” case studies confirmed the reinforcement of cult beliefs following disconfirmation (Dawson, 1999), although such reaffirmation is not invariable (Balch et al., 1983). Nonetheless these studies suggest a biased handling of disconfirmatory evidence by paranormal believers that allows their beliefs to persist (Jelalian & Miller, 1984).

Methodologically superior laboratory investigations of disconfirmation effects with paranormal beliefs have compared performances of believers and skeptics on a task that entailed a refutation of their beliefs. Russell and Jones (1980) presented to paranormal believers and skeptics the abstract of a journal article that purportedly disproved the existence of ESP. Believers subsequently could recall less information from the abstract than did skeptics, and some believers distorted their account of the abstract’s contents to accord with their beliefs. In a follow-up study, Jones and Russell (1980) presented participants with a demonstration of an ESP card-guessing test that was either highly successful or unsuccessful (at chance). Broadly speaking, both believers and skeptics concluded that ESP had occurred in the successful demonstration, but only the skeptics believed that ESP had not occurred in the unsuccessful demonstration. The researchers concluded that the believers, but not the skeptics, showed a disconfirmation effect; that is, believers discounted evidence that did not confirm their belief about ESP (Batson (1975) reports similar effects in the cognate context of religious beliefs).

The research literature therefore suggests that paranormal believers are relatively susceptible to a *disconfirmation bias* (Edwards & Smith, 1996), that is, they are inclined to bias their interpretation of disconfirmatory evidence to accord with their beliefs. There remains a possibility, however, that this strategy is not specific to evidence about the existence of the paranormal. That is, do paranormal believers have a more general bias against disconfirmation of any of their beliefs, even when the beliefs are inconsequential and largely devoid of personal significance?

Contemporary research on the consequences of belief disconfirmation gives primary emphasis to the psychological construct of bias against disconfirmatory evidence (BADE). This cognitive bias is reported to have two basic components (Speechley et al., 2012): the degree to which disambiguating evidence influences a belief through its integration with the belief, and positive response bias or a willingness to accord a conclusion with high certainty when justified by the evidence. The measurement of these two components has been progressively refined through the development of the BADE test (e.g., Woodward et al., 2006) and there is now an extensive body of literature in which the BADE test has been used to index the susceptibility to disconfirmatory bias (e.g., see Eisenacher & Zink, 2017; Ward & Garety, 2019).

The hypothesis of paranormal believers' poor performance on the BADE test has been addressed by only one study. Prike et al. (2018) observed significant negative correlations between paranormal belief and the BADE components, namely, a readiness to integrate disconfirmatory evidence with the content of an existing belief ($r = .19$ to $-.25$, $p < .01$) and a readiness to adjust the strength of a belief in light of the available evidence ($r = -.35$ to $-.40$, $p < .001$). Across a variety of methodological procedures there is therefore consistent evidence of disconfirmatory bias in paranormal believers, a reluctance to revise beliefs in the face of disconfirmatory information, contrary to the ideals of evidentialism.

Discussion

When considered collectively, there is sufficient evidence here to suggest that paranormal belief is correlated with a susceptibility to various violations of Cliffordian ethics of belief. Admittedly there are occasional lacunae and shortcomings in the database, and the documented relations attest to relatively small effect sizes. Even if confirmed by further research, violations of evidentialist principles of course may be just one contributory factor in the formation and maintenance of paranormal beliefs. Further, undoubtedly there are a few people who deliberate very carefully before endorsing a belief in paranormal phenomena (Irwin, 2017, pp. 177–178), so any association between belief and evidential violations would not be expected to be universal; as with any theoretical model there will be individual cases and subgroups of cases for which the model is a poor fit. At the same time, the small effect sizes cited here may be accumulative and interact with those of other factors related to the formation of paranormal beliefs, so the theoretical significance of evidential violations should not be underestimated.

Interpretation of the available empirical findings also prompts a caution with respect to investigators' reliance on *linear* statistical analyses. As noted in our survey of confirmation bias Hergovich et al. (2010) and Butzer (2020) demonstrated the operation of this bias among paranormal skeptics. Findings for the various types of violation of Cliffordian ethics may therefore need to be reanalyzed for the phenomena at *both* extremes of the belief continuum; curvilinear analyses may yet identify violations among skeptical participants. The factor of dogmatism could well be a case in point; it would be inappropriate (and certainly counterintuitive) to interpret the empirical findings to imply that skeptics have *no* dogmatic tendencies whereas paranormal believ-

ers do. Dogmatism is commonly associated with extremist beliefs regardless of their direction (Johnson, 2009). In short, past linear statistical analyses at best indicate that believers are more *strongly* prone to evidential neglect than are skeptics. Future studies of reasoning styles across the belief–disbelief continuum would do well to include curvilinear analyses of these relations.

Given a tendency of paranormal believers as a group to be relatively less inclined to form, maintain, and relinquish beliefs on the basis of relevant evidence, the question arises as to why this is the case. Evidentialism is of course an idealistic position; philosophers and cognitive scientists would prefer people to generate their beliefs in a fundamentally rational manner and thereby to seek “truth” that is maximally consonant with reality. But human beings are not uniformly capable of such untainted rationality (Miyazono & Bortolotti, 2021). Rather, they are subject to all manner of motivational biases in everyday life, and their thought processes are vulnerable to common if unwitting logical flaws (Gilovich et al., 2002), many of which could serve to subvert the ideals of evidentialism to a secondary consideration. Since the pioneering work of Taylor (Taylor, 1983; Taylor & Brown, 1988) beliefs have been understood not only as a person's attempt to represent “truth” but also as a means to serve significant psychological needs of the person. The need most widely promoted to instigate paranormal beliefs is the need for a sense of meaning in or mastery over life events (e.g., FioRito et al., 2021), particularly events in the interpersonal domain; for a review of this literature see Irwin (2009, pp.118–121). Coupled with paranormal believers' proneness to dissociate and fantasize (Irwin, 1990, 1994; Makasovski & Irwin, 1999) this need may well partly override an evidential imperative in the formation of beliefs.

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Poetic Confluence:

The Social Organization of a Telepathic Experience¹

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Abstract: This paper is an exploratory sociological analysis of poetic confluence, a spontaneous telepathic phenomenon that occurs in everyday social interaction. In poetic confluence, one person's talk exhibits an enigmatic relationship to another's unstated thoughts or imagery at that moment. The analyses draw from an empirical approach called Conversation Analysis, a formal qualitative method for the analysis of naturally occurring interaction in everyday life. In Conversation Analysis, talk-in-interaction is analyzed as coordinated and sequentially organized action. The focus on the action orientation of talk informs this analysis, treating poetic confluence as a form of social action. The data are (unavoidably) anecdotal accounts of experiences. Although the techniques of Conversation Analysis cannot be applied to anecdotal reports, its methodological principles and substantive focus can inform a systematic analysis of anecdotal data. A case is made for the robustness of poetic confluence via analysis of recurrent properties found in examples from three corpora of candidate cases. The analysis identifies three interpersonal functions of poetic confluence: its role in restoring mutual attention; its affiliative, affective function; and its role as a mechanism for managing threats to social propriety, or keeping "face." In the discussion, alternative skeptical explanations are assessed; the empirical approach is framed in terms of Cardena's (2019) observations on the metaphoric quality of some psi phenomena and Carpenter's (2012) first sight theory, and some suggestions are offered for further research on social interaction and psi phenomena.

Keywords: Poetic confluence, spontaneous cases, interaction, turn design, face-work, psi.

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Highlights

- This paper offers a sociological analysis of poetic confluence, an ostensibly spontaneous telepathic phenomenon that occurs in everyday social interaction.
- The analysis is informed by an empirical approach to the analysis of interaction that treats talk as social action, and the vehicle for the management of interpersonal relations.
- I argue that poetic confluence is a resource for the coordination of mutual attention, affective affiliation, and the management of threat to social propriety.

This paper is an exploratory sociological analysis of a telepathic phenomenon that occurs in naturally occurring social interaction. The phenomenon, which I call poetic confluence, occurs when one interlocutor's turn seems to refer to, allude to, or "capture" another's unstated thoughts or imagery at that moment. Here is an illustrative example. This is the text of an email sent to me by one of my former undergraduate students, in which she describes part of a conversation between her partner and his friend, which her partner, aware of her interest in the phenomenon, related to my student to pass on to me.

Example 1: Rattled/Ratted

A and B used to work together until B moved to a different job to become a manager, they now frequently meet in the pub in which B works to catch up. A had just been fired from his job and was in the pub telling B about how it had happened, however, B was preoccupied thinking about a rat he had seen earlier in the day and how disgusting it had been. A then announced that the whole situation that led to him being fired had really 'ratted' him, going on to correct himself to 'rattled', which directly articulated the thoughts that B was having regarding the rat.

One interlocutor's turn, in which he incorrectly uses the word *ratted* to convey his response to being fired from a job (ratted being a UK vernacular term for drunk), seems to chime with the other's contemporaneous recollection of being revulsed by his encounter with a rat. On first inspection, this seems like mere coincidence. I will make the argument that there is evidence for the robustness of this phenomenon in a later section. But first

it is necessary to outline the value of a sociological approach to understanding this form of ostensibly spontaneous telepathic experience.

Research on spontaneous psi experiences is longstanding and diverse (White, 1992). From the early days of psychical research, investigation of spontaneous cases tried to establish the objective reality of mind-to-mind contact (Gurney et al., 1886) and precognition (Besterman, 1932-33; Saltmarsh, 1934). Louisa Rhine's analysis of the several thousand unsolicited epistolary accounts submitted to the Rhine laboratory at Duke led to a thematic classification of types of experiences and the conditions in which they occurred (Rhine, 1981, 2018; see also Kelly & Tucker, 2015; Stevenson, 1970). Survey based research has revealed the incidence of subjective paranormal experiences in various populations (Castro et al., 2014; Haraldsson, 1985; Palmer, 1979), and there has been research to identify psychological features, such as associated imagery, vividness, and degree of conviction (Alvarado, 1996). Since the 1980s there has been interest in the phenomenological features of spontaneous cases (Alvarado 1984; Drinkwater et al., 2013; Schlitz 1983; Simmonds-Moore, 2016).

There are some common themes. First, there is a focus on what Carpenter (2012) calls *lightning bolt* examples of spontaneous experience, such as inexplicable awareness of a distant other's death or injury. There is much less attention given to more mundane experiences. Second, parapsychological research on spontaneous cases reflects the concerns of the parent discipline, psychology. There is a focus on psychological correlates of experiences, and there is an assumption that psi is a form of information exchange between discrete brains. Apart from some sociologically informed survey work, there has been little interest in the sociological contexts and correlates of spontaneous experiences, even though the potential relevance of social and cultural variables is occasionally acknowledged in the parapsychological literature (Edge, 1986; Radin, 1997: 293; Schmeidler, 2018), and explored in work on paranormal beliefs and themes in popular culture (e.g., Jenzen & Munt, 2013). Finally, there is an assumption that research on spontaneous cases is less scientifically valuable than experimental research. This was explicitly articulated by Louisa Rhine in publication (1981) and in private conversation (Alvarado & Zingrone, 2008); this is also reflected in the sheer volume of experimental research compared to studies of spontaneous psi experiences.

This analysis complements these themes. It examines a phenomenon rooted in everyday concerns, not exceptional lightning bolt moments, and develops a distinctly sociological approach, in that it proposes that poetic confluence should be examined as a form of social action, not information transfer. Finally, it emphasizes the importance of the naturally occurring social contexts out of which instances of the phenomenon emerge.

It has been long acknowledged that if telepathic communication is real, then its home environment is not the laboratory, but everyday life (Irwin & Watt, 2007). And if it is a form of communication – albeit one whose mechanisms and properties are by no means fully understood – then we may ask how it connects to other forms of more mundane communication, such as ordinary conversation. We have the basis for this broadly comparative interest. Since the 1960s, there has emerged in sociology an approach to the study of conversational interaction which has come to be known as Conversation Analysis, or CA. Despite its origins in sociology, it is now influential in many social science disciplines concerned with what is referred to as *talk-in-interaction* (e.g., Schegloff, 1987). A key assumption of CA (and one that emerged from empirical analysis) is that talk is not merely a mechanism for the exchange of information but a form of social action: we use it to do things to each other, and with each other. In this, it reflects Wittgenstein's later philosophy of language (Wittgenstein, 1953), and the speech act theory proposed by the philosopher J.L Austin (1962). However, CA is not a philosophical perspective but a highly technical and detailed empirical analysis of the organization of interaction at a micro level. The empirical objective is to identify and describe robust sequential patterns in talk through which speakers produce orderly and intelligible interaction. Part of that enterprise is to explicate the tacit norms and assumptions that underpin social interaction. This reflects the influence of Erving Goffman, whose pioneering research into the normative basis of face-to-face interaction established the micro social order as a legitimate domain for sociological inquiry (Goffman, 1983).

Although the phenomenon of poetic confluence cannot be examined using the techniques of CA (for reasons which will become apparent) it is still useful in two senses. First, there is now a substantial and cumulative understanding of the formal properties of talk through which people manage social actions such as turn-transfer, correction and repair, person reference, affiliation and alignment, and storytelling, among many other features of everyday talk. The findings from CA research can therefore help us understand the social dimension

of telepathic experience. Second, it provides a distinctive empirical perspective, a “conversation analytic mentality” (Schenkein, 1978), which offers new ways to think about telepathic communication as a form of social action.

Data and Analytic Method

At the time of writing, I have 60 candidate cases. It is not possible to generate examples of this experience; I have to wait for people to send me accounts of their spontaneous experiences and monitor my own everyday interaction for examples. Consequently, the corpus was developed in the same way that Freud collected instances of slips of the tongue (Freud, 1975 [1901]), linguists collect speech errors (MacKay, 1980), and psychologists collect moments of spontaneous inappropriate conduct (Norman, 1981). Seven cases were published in books or articles about paranormal experiences and were spotted by readers aware of my work, who then sent me photocopies of the relevant page(s). Of the remaining 53, I am involved in 20 examples. The remaining 33 cases come from friends, colleagues, and undergraduate and postgraduate students. All were sent to me via email, and the senders were aware that their accounts would be included in my research before they sent them. Three cases used in this paper are second hand in that they occurred to acquaintances of the person who sent an account to me.

Most cases arise in ordinary conversation but there are some examples in work settings. There is no common topic in the ongoing conversation into which the apparently telepathic turn intrudes. Neither do the data suggest any common relationships between the people involved, as there are instances that occurred between relative strangers, professionals and their clients, close friends, domestic partners, work colleagues, and family members. When presenting the cases below submitted to me via email, I have retained the original spelling, formatting, typos, and grammatical lapses. All names have been anonymized. Where possible, other identifying details have been removed or anonymized. I have also used examples from two other collections as evidence of the robustness and consistent features of the phenomenon.

The data are unavoidably anecdotal and so there are issues of accuracy of recall, selectivity in reporting, the effects of confirmation bias, and so on, but there is no alternative form of data. If we are to investigate this

phenomenon (if it is accepted that there is a phenomenon), then retrospective anecdotal accounts are all we have. However, we can develop a more formal empirical analysis of these data if we draw from Conversation Analytic research on naturally occurring social interaction. To grasp what CA can offer, it is helpful to discuss an illustrative example. This does mean a momentary detour from a focus on the telepathic experience. However, it allows me to provide a rationale for the way that I subsequently go on to build the argument that poetic confluence is a robust phenomenon and illustrates the claim that talk is a form of social action (introductions to CA can be found in Atkinson & Heritage 1984; Hutchby & Wooffitt, 1998; Sidnell & Stivers, 2013).

CA and the Study of Talk-in-Interaction

In CA research analysts work with corpora of audio and video recorded data of naturally occurring interaction, transcribed to capture aspects of talk normally excluded from more conventional orthographic transcriptions. It is conventional for corpora to be shared in the CA community (and beyond). Thus, when beginning analysis, researchers may have access to several hundred hours of transcribed recordings. Analyses may proceed with a specific question, for example how are repairs/corrections organized? However, many projects begin with an unmotivated noticing of something of interest.

Such was the origin of Drew’s (1987) study of teasing. From working with various corpora, he noted that on occasions, a speaker may produce a joking or playful tease directed to another. The target laughs, recognizing the playful nature of the remark, but then they produce a serious response. Drew was puzzled: why would someone respond seriously to an utterance they have demonstrably recognized to be non-serious? Here is an example, which comes from a video recording of a family dinner, recorded to collect a corpus of video and audio data of ordinary family activities. (This is a heavily simplified version of the transcribed data).

From Drew, 1987, p.22.

Dot: Do we have two forks 'cause we're on television?

Mother: No we-

Angie: (Laughs)

Mother: (Laughs)

Father: Yeah (laughter) probably the answer right there

Mother: You have pie- You have pie tonight

The tease “Do we have two forks 'cause we're on television?” refers to the presence of the camera and is addressed by a daughter to her mother. The mother begins to respond to the tease by saying “No we-” which is the start of a rebuttal and an account for the unusual presence of two forks. Angie begins to laugh, recognizing the tease, and the father joins in. Then the mother joins in. When the laughter has subsided, she resumes and completes her account, stating that the additional forks are on the table because she is serving a pie for dessert.

Drew collected numerous other instances of what he terms a po-faced, or serious response to teases. Many cases exhibited the same pattern: the tease, the target's recognition of the tease through laughter, and then their serious response. Drew's analysis shows that the design of the tease ascribes a mildly deviant identity to the teased party or proposes that the teased party's behavior is marginally out of the ordinary. So, “Do we have two forks 'cause we're on television?” implies that Mother is being pretentious in her choice of cutlery simply because they were being video recorded (“on television”). Drew's analysis shows how the po-faced response undercuts the ascribed deviant identity and re-asserts a non-deviant identity. For example, Mother's “You have pie tonight” offers a pragmatic explanation for the presence of the additional forks and thereby rejects the ascription of pretentiousness.

This is a very short account of a detailed analysis, but it demonstrates three features of the CA approach that can inform an analysis of telepathic moments in social interaction. First, it is necessary to establish the recurrent properties of the phenomenon. Drew did this by demonstrating the same tease – laughter – po-faced response sequence over numerous extracts taken from various corpora. Second, he shows how the design of turns produce social actions. So, the selection of the word television (as opposed to, say, camera or video) constitutes that turn's action as a tease. Finally, his analysis of the way that mildly deviant identities are ascribed and resisted in tease sequences demonstrates how interpersonal relations are tacitly negotiated (and resisted) in the moment-by-moment unfolding of talk.

The data for CA research are recordings of interaction and their transcriptions. It focuses exclusively on what can be publicly observed and recorded. For that reason, it is not possible to use CA to examine cases of poetic confluence, as they necessarily involve an introspective element that cannot be recorded. However, the focus on patterns, the actions produced through talk, and the negotiation of interpersonal relationships can *inform* our analyses of anecdotal accounts of this kind of telepathic experience.

The Case for Poetic Confluence

Poetic confluence is a playfully realized confluence of one person's interiority and another's talk, seemingly unmediated by everyday communicative processes. The first formal identification of this phenomenon in English appears in a chapter by the conversation analyst Emanuel Schegloff (Schegloff, 2003). One day, working with a colleague, Gail Jefferson, he observed her bring a pencil to her mouth, rather than the cigarette she was holding with her other hand. Immediately, Schegloff was reminded of an incident he had witnessed as a student when, during a class, a very famous academic used a piece of chalk to scratch his ear, and absentmindedly left the chalk protruding as he continued his lecture. This is Schegloff's (2003) description of what happened next.:

The recollection of [this] incident apparently brought a smile to my face, a smile which Jefferson noticed and understood to be responsive to her miscue in bringing the pencil rather than the cigarette to her mouth. Displaying her grasp of my smile's source, she remarked, “Oh, that's an earmark of mine.”

I registered the pun-like character of her remark, the interest in vernacular poetics being one shared by the two of us... I was about to comment on the one I had just heard from Jefferson when I realized that the comment “Oh that's an earmark of mine” constituted a pun on *something which had not been said but had only been 'thought' or 'recollected' or 'flashed'*. It was, in that sense, an ESP pun, however absurd that appeared to be to someone who did not believe in parapsychological phenomena. (pp. 531-532, emphasis in the original).



Having initially noticed the phenomenon, he had other experiences, as did colleagues and students to whom he had spoken of his experiences, building a small corpus. His 2003 chapter is not a formal analysis, but a presentation of 16 examples in this corpus, which at that time consisted of 20 cases.

Schegloff noted that throughout his collection, the turns that appear to connect to the other's unstated thoughts exhibit unusual features in that word selection may be in error, clumsy, or ill-fitted to the context, and is not an idiosyncrasy of that person. For example, in the case with Jefferson, what Schegloff termed an ESP pun is constituted by Jefferson's use of the word *earmark* to capture the kind of recurrent trait or characteristic which would normally be described as a trademark, or hallmark. Although this word is not fitted to the kind of turn she was making, it seems to have a conspicuous relation to the imagery that had come to Schegloff's mind when he saw her bring the pencil rather than the cigarette to her mouth. This conspicuous turn design is common to the phenomenon. Here is another example from Schegloff.

I am visiting with friends in England, talking about the behavior of fans at sporting events. He is comparing cricket and football (soccer) in England. I am thinking of telling, when the turn is mine, about the soccer game my wife and I attended in Campinas, Brazil, after which the fans set fire to newspapers in the stands. My friend is telling me that families go together to cricket matches but not to football, and says "They've burnt off families going." Subsequently he says that he "flashed on" the phrase "burnt off" a few moments before using it, which would be just as I was forming up my next tellable. And, it turns out, this is not an ordinary usage of his, and is unidiomatic in context. (Schegloff, 2003, p. 538)

"Burnt off" seems to reflect the experience that Schegloff was planning to report in his next turn; it is not, though, a phrase conventionally used to describe how people might be deterred from attending sporting events, or indeed, any event.

Schegloff, however, was not the first to publish accounts of this kind of telepathic incident. In 1933 the Hungarian psychoanalyst István Hollós published examples of the many hundreds of telepathic experiences



with patients he had observed during his career (Hollós, 1933). A translation of this paper revealed that many of the cases match the features of the Schegloff collection and my corpus. For example:

I was agitated because the next patient, who had pointed a revolver at me during the last session, was already in the waiting room. He was a hot-headed young man. Worried, I thought that he could shoot his gun in the other room in this very moment; in my imagination I already heard the shot. The female patient talked about her mother who does not leave her in peace and who walks around the flat furiously:

"Then she shoots around in the flat", she says in Hungarian. However she uses the German word but in a butchered Hungarian phrase - "schiesszol ide - oda". In correct Hungarian one can only say: she ran back and forth.

Here there is a clumsy phrase which, according to Hollós, contains an explicit error. The patient refers to her mother walking around the flat in "butchered Hungarian" with (presumably unexpected or inappropriate) elements of German contaminating a conventional Hungarian figure of speech. Yet this clumsy phrase captures Hollós' unarticulated anxieties about the next patient who had, in the previous session, brandished a firearm.

This example illustrates another recurrent feature of the phenomenon. The imagery or thoughts captured by the spoken turn seem to concern unusual events, evocative imagery, or emotional themes. The cases so far: encountering a rat in a pub, an esteemed professor leaving chalk in his ear; recollection of people starting fires in a sports stadium, and concerns about a possible shooting. Here is an example from my corpus, sent to me via email by a colleague who had attended a talk by a visiting academic.

Example 2: SPD/Make No Bones

The experience happened in today's informal discussion with a visiting scholar - Beth Gordon. Beth was talking about the professional/personal dilemma of being a Reiki practitioner in her personal life while working in a post-structuralist cultural studies department in her professional life.



At some point during the talk, I started to think about the one time I had had Reiki treatment. The therapist had picked up some problem in my...uhm...middle area (?!). This was 'correct' in that during my fourth pregnancy I had suffered with Symphysis Pubic Dysfunction (SPD). This is a condition in which the connective tissue that holds the two pubic bones together over-softens, making movement difficult.

During Beth's talk, I had a very strong visual image of two bones being separated by a large gap - the image was very vivid and an exaggerated version of SPD. The image was accompanied by a strange sensation of my head being open - almost that my thoughts were visible to others.

At the moment I had this image, I heard Beth say '...you know, I make no bones about that'. The coincidence struck me immediately. Unfortunately, I had been too lost in my own thoughts to hear what had led up to Beth using this phrase. It is worth noting, though, that later, on hearing the story, she spontaneously said that it was not a phrase that she uses.

During the talk, the reporter's thoughts drift to her recollection of developing Symphysis Pubis Dysfunction during pregnancy. This is clearly a sensitive issue. Her use of 'my...uhm...middle area (?!)' to refer to her pubic area explicitly acknowledges the intimate nature of the condition. Her imagery of her bones physically separating is an evocative exaggeration of the condition. The speaker's use of the phrase "make no bones" (which is conventionally used in US and British English to convey unapologetic honesty) is a literal allusion to the reporter's imagery. Though we cannot be sure that the phrase was ill-fitted to the precise moment of the talk in which it was used, it is notable that the speaker later confirmed that it is not an idiosyncratic phrase.

Schegloff called these apparently parapsychological connections between imagery and utterance ESP puns. Although this is an arresting term, there are grounds for exploring alternatives. Puns are just one of a range of conversational poetic forms (Jefferson, 1996; Wooffitt, 2011; Wooffitt et al., 2021b), a range reflected in reports of poetic turns. Moreover, the use of "extra sensory perception" rooted as it is in experimental parapsychology, focuses on cognition, and overlooks the social and interpersonal features of the phenomenon. For these

reasons I have adopted the term *poetic confluence* to capture how private conscious experience and public utterances appear, on occasion, to come together and find expression in poetic forms.

Drawing from Schegloff's initial observations and my own analysis of all available cases (my collection and the examples presented in the publications by Schegloff and Hollós), there seem to be robust and recurrent properties of poetic confluence in social interaction.

- The phenomenon is a confluence of public talk and unarticulated conscious experience.
- The turn which seems to allude to the other's private thoughts contains a speech error, or an infelicitous or unusual phrase.
- That turn is concerned with the business at hand - the conversational topic at that moment - and is not produced as an attempt to guess or mimic what the other is thinking about.
- It is this incorrect or unusual word or phrase selection that constitutes that utterance's ostensibly telepathic relation to the other person's imagery or thoughts.
- The turn that appears to capture the other's imagery or thoughts has poetic, sometimes playful qualities.
- The imagery or thoughts which are captured by the spoken turn seem to concern unusual events, evocative imagery, or emotional themes.

Before we proceed with a sociological analysis, it is important to recognize that there is a clear parallel to features of Freudian slips of the tongue (Freud, 1901/1975), in that the speech error seems to give voice to the kind of sensitive imagery or thoughts a person might not wish to disclose. What is unusual is that the utterance voices another's unarticulated concerns: these are slips made on behalf of the other, not inadvertent disclosures about self. This dyadic foundation makes relevant several interpersonal issues, some of which are explored in more detail later.

Having established the features of the phenomenon via examination of three corpora, we can begin to examine three social functions: the coordination of mutual attention required for turn-taking, affective affiliation, and managing face, or social propriety.

Mutual Coordination and Turn Transfer

Ordinary conversation requires us to take turns. Turn transfer is so ubiquitous and central to social life that it is difficult to imagine that it requires concerted and collaborative effort. Yet it is an extraordinary achievement. At the start of a conversation, it is difficult to predict the topics that might arise (even if there is an intention to raise some specific matter); there are no restrictions on the length of turns, and there are no rules determining the type of turn that a speaker might produce. Interaction involving more than two parties adds to the difficulty of determining who among the possible next speakers will take the floor as we do not enter into conversation with a pre-allocated turn order.

Conversation analytic research on turn transfer has established that turns are designed to project when they may be coming to an end, which allows possible next speakers to anticipate the onset of a normatively appropriate (that is, not interruptive) moment for turn transfer (Sacks, et al., 1974). Syntax, prosody, turn design, and body and head orientation are some of the cues projecting the end of the current turn (for an overview of research on turn construction and turn transfer see Clayman, 2013; Hayashi, 2013). The requirement to anticipate when turn transfer may be normatively appropriate provides a motivation for current non-speakers to pay close attention to the unfolding design of the ongoing turn. Although this monitoring may be entirely tacit, and unnoticed by conversationalists, it is well documented in empirical research; for example, at the onset of turn completion potential next speakers can be heard to take inbreaths in anticipation of speaking or begin their turn just prior to the projected turn completion. Mutual attention to ongoing talk is therefore fundamental for the achievement of orderly turn transfer.

It is a common feature of many accounts of poetic confluence that the reporter describes being distracted from the ongoing conversation just prior to the experience. There are reports of daydreaming, minds wandering,

and the onset of inwardly focused reverie. In these moments, when reporters disattend to the ongoing talk, they momentarily fail to meet the basic requirement for coordinated social interaction. There is evidence, though, that poetic confluence works to restore attention and mutual coordination. This is because the turn that constitutes the telepathic connection seems to restore the other’s attention to the here-and-now. In the following case, for example, the reporter finds herself distracted by images of injury from a skiing accident, such that she misses part of a friend’s ongoing story.

Example 3: Leg Break/SNAP

I also had another paranormal pun, while I remember, my friends B, K and I were talking about a skiing holiday B had been on in Easter, while talking about what a nice time she had, I got an image of me skiing down the hill and breaking my leg in some horrible way, which made me do a bit of a shudder, at which point my friend K said, 'SNAP' really loudly, about another part of the story I had missed, which brought me out of my day dream! I'm not sure if that's a very good one though...

The friend’s SNAP captures the unpleasant imagery, and more significantly, brings the reporter out of what she describes as a daydream. Here is another case, by a then PhD student, who knew the reporter.

Example 4: Mushroom Cloud/Fallout

This is from my friend in Belgium:

It's going to be a bit high level as the full story is technical and would contain very confidential information... If you need it fleshing out more, just let me know. I'm a bit tired, so it's not going to be Shakespeare either.

I was sitting in on a project planning meeting for the upcoming quarter. A few other developers were in the room, and our business and tech management were on video conference from our main office. Our manager got to a point of talking about continuity of business on a global scale, and asked us to look into the possibility of planning a strategy for shifting the physical locations of where our pro-

grams run in case of disaster. He used the far east, specifically Seoul, as an example. This was about the time that North and South Korea were close to going to war, with shots being fired by both sides. At that point an image got into my head of a "mushroom cloud". I was snapped out of this morbid vision, when I heard my boss saying "control the fallout". The usual technical term being overflow or failover in this situation.

Hope that's what you're after.

In this case, the ill-fitted word "fallout" both connects to the reporter's dramatic internal imagery and refocuses his attention on the meeting. On occasion, then, poetic confluence seems to work as a mechanism to ensure the mutual attention required for coordinated turn transfer.

There is further evidence for this conclusion from the psychoanalytic literature. Analysts report that they experience being caught out not paying attention to the patient via an utterance that seems to have telepathic qualities. The following comes from an account of an experience during therapy and concerns the patient's apparently telepathic awareness that the analyst (who refers to himself in the third person) was preoccupied by a letter.

on this occasion... I positively yearned to wind up this letter business... I was impatient because time had been lost. I also had some guilt feelings because I had done an injustice to the patient, who had a right to the analyst's undivided attention. In addition to feeling guilty, I also harboured the hope that the patient would not notice my lack of attention. Hence, when the patient suddenly asked a question about the matter which preoccupied the analyst... the analyst had the feeling that, somehow or other, he had been 'found out' or 'caught in the act'. (Hitschmann, 1953: 129-130).

The analyst felt he had been found out not paying attention to what the patient was saying, which reflected the underlying normative understanding that one has an obligation to attend to co-participants in social interaction. Other therapists have made similar observations (for example, Balint, 1956, p. 32). There is evidence then, that on occasion, a person can be brought out of an inner reverie or internal preoccupation via another's spoken turn that seems to exhibit telepathic awareness. In this, poetic confluence may be just one mech-

anism for assuring mutual attention, which is normatively required and indeed necessary for coordinated management of orderly turn transfer.

Interpersonal Affiliation

Instances of poetic confluence suggest it may be a mechanism for one party to demonstrate or establish an affective, affiliative stance towards another. The interpersonal function is demonstrated in the following case. This was sent to me by a man I had met in a social context, and with whom I had discussed my work.

Example 5: Blube/Bluey

It's Tom, we were chatting in [venue] on Tuesday and you asked me to email you over an account of what I was telling you about. I'm not sure exactly what you need but I'll give you an outline.

Essentially my partner referred to a stuffed animal by a similar name to a childhood toy of mine. The two toys are

A. My partners stuffed toy, a little blue stuffed rabbit called 'Blube' (pronounced like 'tube' but with a 'bl' instead of the 't').

B. As a child my Mum got me a blue teddy bear, which I called 'Bluey' (pronounced like 'blue' but with an 'ey', or 'blue-ee'). My partner did not know about Bluey at the time.

This occurred a bit before the October lockdown. I think it was the afternoon of the 5th September 2020, which is the Saturday after my mums birthday. However, I may be wrong on the exact date but it was certainly around this time.

I was a bit upset as my mother passed away in July of 2019. My partner could see I was upset, moping/down in the dumps sat on our bed, she came in and in the course of chatting picked up and offered me Blube to try and cheer me up. I can't remember the exact words she used at the start of the conversation, something to the effect of "are you ok" and "how are you feeling" as she clearly knew I was upset (though to be honest I'm not sure she knew exactly why). She then said

"...take Bluey, he'll cheer you up."

whilst handing me Blube, she clearly meant to say "...take Blube, he'll cheer you up.". I then asked "Why did you call him Bluey?" and she thought she said Blube and had no recollection of saying Bluey, like when you make a slip of the tongue and don't even notice. She certainly did say Bluey though, it jumped out at me due to the significance of it.

I thought this was pertinent to what you are looking at as this slip of the tongue was related to my Mum, though I wasn't thinking about Bluey at that point (and to be honest hadn't thought about him in years). Furthermore, my partner did not know about this teddybear from my childhood, let alone its name.

The reporter's partner is clearly trying to cheer up the reporter via the playful offer of her teddy bear, but the error in her turn reproduces a toy's name central to the cause of the reporter's low mood. It is not the objective of this paper to delve into psychological explanations, but in offering the toy with the name of the reporter's childhood teddy the partner essentially enacts the absent mother's response to her child's distress or unhappiness. Affiliative enactment is also evident in the following case. This comes from a person who, with his partner, was involved in an expensive, lengthy, and highly stressful property renovation project.

Example 6: Absent Frenchman/Monsieur

My partner and I had arranged to meet Francois, the wood craftsman, at the hall at 8 am to discuss our ideas and requirements for a staircase which he was to design and build. He did not turn up. While we were waiting, becoming increasingly annoyed, my partner and I made some fairly ripe stereotypical remarks: that he will turn up on a bicycle, with a bag of onions, that kind of thing. After an hour of waiting around, Francois had still not arrived, or called, and we had to leave for work, now entertaining the idea of contacting someone else to do the stairs. We were both very frustrated by Francois' no show: apart from wasting our time, we knew that finding a new craftsman would be difficult so close to the end of the project, and his estimated fee had been very reasonable, and managing the cost of the project

was a constant source of stress for us both. As we were leaving I made a jokey remark to Neal, the site foreman, that eventually led to spate of interaction that centred on Francois' nationality: I said to Neal if a Frenchman turns up, tell him he's just lost a big job. Neal said 'muppet' [*used in the UK vernacularly as a derogatory term, implying foolishness - Author*] and I said "Le muppet' with French pronunciation, ie, not pronouncing the 'et', but saying 'ay'.

I arrived at work, extremely aggravated. At about 10 am, X [a colleague] came to speak to me. My door was slightly ajar but my back was turned to it. He knocked, I turned round, he entered the room and said, theatrically, 'Monsieur.' Before he had chance to ask me what he wanted to ask me I asked him why he had selected that term of address; he said he didn't know why. He hadn't addressed me like this ever before [or since]; he is not French, nor had he just been to France. But it seemed perfectly fitted to my pre-occupation with Francois and the way that his nationality had become invoked in a series of banterish exchanges with Neal.

The unexpected use of a French address term resonates with the reporter's preoccupations with a French craftsman. In addition, there is a performative and embodied aspect to this case. As he says Monsieur, the colleague is walking into the reporter's office, thereby physically presenting himself as a Frenchman to a person preoccupied with the absence of a Frenchman.

In the next case the poetic turn establishes an alignment between the two interactants. There is also an epistemic element, in that it revolves around momentary lapse in knowledge. This was sent to me by a then Ph. D. student, and concerns an experience that occurred while visiting Belfast, in Northern Ireland. Although the nationalistic and sectarian violence (known as the Troubles) have largely ceased since the 1998 Good Friday Agreement, there are still significant tensions in Belfast between the pro-British Protestant Loyalists and the Catholic Republicans, who want to see a united Ireland (for example, Catholic and Protestant communities are still segregated by numerous barriers throughout the city).

Example 7: Green Man/Loyalist Man

I had to email also as I think I experienced an "ESP Pun", and thought this may be of interest to you! I have been in Northern Ireland visiting a friend over the weekend. As we were walking into town (Belfast) we approached a set of traffic lights. There was one car waiting, but not knowing the roads I stopped on the pavement. On looking at the traffic light I had a sudden image of a flag come to my mind, initiated by the colours of the traffic light, which was on red. I thought to myself at that point, "What are the colours associated with the loyalist and 'other' group, that are in conflict over here" (at this point I had forgotten the name of the Republican group). This thought had come to mind because of the colours on the traffic light. Just after I had this thought Phil turned around to me and said, "Why are we waiting?", and I replied, "We are waiting for the green man", at which point he said, "Its not the green man, its the loyalist man" (as a joke).

This was of course interesting because he had just put into conversation what I was thinking about. However, what is more significant is that this was an error. The colours for the loyalists are red and blue, the colour for the republicans is green. Phil is very into his history, and very precise with facts, so it is unlike him to make this sort of error, and he did not even pick up on it. It was also interesting that I had a strong and spontaneous visual image at this moment, and also that I had forgotten the term "republican."

This, then, is a notable, albeit momentary, epistemic lapse on the part of the reporter. There is then a brief spate of interaction: the friend asks why they have stopped walking, and the reporter refers to the pedestrian crossing system which is yet to display an illuminated green figure indicating it is safe to cross. The friend appropriates the reference to the green man and makes a joke, saying 'Its not the green man, its the loyalist man' [sic]. This is, of course, an error. The friend's turn thereby alludes to the reporter's momentary preoccupation and produces as his public error precisely the category of epistemic problem the reporter was experiencing privately at that moment. His turn establishes that she was not alone in having trouble with the colors associated with local political and religious factions. In this, it demonstrates recognition of and alignment with her difficulty.

Managing Face

Earlier I discussed a CA paper on the organization of teases and po-faced responses. That analysis revealed how the tease attributes a mildly deviant identity to the target of the tease; and it showed how the po-faced response addressed and rebutted that identity. In this, the po-faced response is a form of what Goffman termed face-work. Goffman (1967) defines face as "the positive social value a person effectively claims for himself [sic]... during a particular social contact. Face is an image of self delineated in terms of approved social attributes..." (p. 5).

Face-work, then, refers to the social activities we engage in to present to others a positive sense of self. Threats to face may arise from momentary lapses in etiquette or competence, unintendedly inappropriate remarks, interpersonal stumbles, slips of the tongue, unexpected bodily emissions, and so on. These constitute departures from "approved social values" and can derail interpersonal conduct, as they require remedial work to manage the threat to face. However, the requirement to manage the presentation of self does not only apply to our own face but applies equally to the face of others: "A person will also have feelings about the face sustained for the other participants...they constitute an involvement in the face of others that is as immediate and spontaneous as the involvement in his own face. One's own face and the face of others are constructs of the same order..." (Goffman, 1967, p. 6). When others experience a loss of face, it threatens the collective moment, and thereby our participation in it; Goffman documents the various ways in which we can "counteract 'incidents' [that are] events whose effective symbolic implications threaten face" (Goffman, 1967, p. 12).

In many of the poetic confluence cases, the reporter's thoughts or imagery constitute a transgression of moral and social boundaries, which, were they expressed in public, would likely be met with disapproval or embarrassment. It is a robust feature that the turn that establishes the psi relationship works to address and detoxify the transgressive elements of the other's inner experiences. The next example of poetic confluence provides a stark example.

Some ethnographic context is helpful. The reporter is a personal acquaintance who described in an email an experience that happened to his partner, a podiatrist, two days after they had attended a public lecture in

which I discussed the phenomenon. The example involves a homophobic and highly distasteful slang term in British English to refer to gay male sexual activity. The person who sent the email acknowledges the transgressive character of the phrase in his remark that I may not be able to use this case. For those unfamiliar with British food, chutney (also known as “pickle”) is a dark brown relish made from fruit, spices, sugar, and vinegar.

Example 8: Chutney Ferrets/Pickle

Got a great one from Kathy: very amusing and I think very real!! Although not sure you can use it.

Kathy (K) is talking to a patient (P) who is describing the fact that she was walking her (extremely camp, completely raving) gay neighbours' dogs yesterday afternoon as she does regularly. On hearing 'extremely gay neighbours' the phrase 'Chutney Ferrets' popped into K's head. She is just thinking 'Chutney Ferrets' and inwardly laughing to herself at the phrase when P says

'Yes and the dogs running around got me into a right pickle!'

The key element here is the phrase “chutney ferrets” that comes to the podiatrist’s mind when the patient refers to the unambiguous sexual orientation of the dogs’ owners. Although this account is second hand, coming via her partner, there is no evidence that she, the podiatrist, recognized the offensiveness of the term; indeed, she is described as finding it amusing, and, presumably, her finding the phrase to be amusing was included in the account as she reported it to her partner.

It is at this point that the patient reports that the dogs “got me in a right pickle,” a British English idiom which is used to capture mildly difficult personal circumstances, often with non-serious or even humorous features. As a synonym for chutney, pickle therefore captures that component of the podiatrist’s thoughts; but it also deletes the overtly homophobic and graphic bodily connotations of the phrase chutney ferrets. It displays awareness of the other’s thought, but discretely overlooks the offensive component. In this, the poetic turn is a type of formulation.

In everyday social interaction, formulations are turns in which one person glosses the sense or upshot of either another’s prior talk (Heritage & Watson, 1979) or their own prior talk (Wooffitt, 1991). Formulations

perform interpretive operations on prior talk, preserving, deleting, or transforming components, and thus can be the vehicle for a range of pragmatic actions. In this case, pickle deletes the sensitive and sanctionable components of the podiatrist’s thought, thereby performing face-work, directed not to a lapse in public conduct but in private thought.

Here is another example of a poetic turn displaying recognition of what might be seen as an inappropriate thought (preparing for a “bad taste” joke) while deleting the inappropriate element.

Example 9: Claudia/Cloudy

Three participants: A, B and me are in a bar. A had been talking about difficulties in securing a nanny for the two children. A first had to be sent home because she did not follow the mother's instructions. The second had arrived the previous weekend, but was so timid and so clearly unhappy about being in the UK, that A's partner took her to the airport to go home at the end of the first weekend in the job. A was reporting this primarily to B because I knew about the problems with the first nanny though not the second. As he was telling B about the second nanny the jokey idea formed in my mind that he was making claims that the nannies had been sent home or returned, but that in fact no one had ever seen them. My line of thought was arriving at a joke about murdering his nannies, and led to a connection to Claudia Lawrence the York chef who had disappeared in March 2009 and not been seen since. At the time that my mind was arriving at the name 'Claudia', A was reporting to B of his annoyance with the nanny agency who had sent him someone so clearly unsuitable and unprepared (for a second time). He was reporting how telephone conversations with the agency had been problematic. At the time the name 'Claudia' flashed into my mind he reported that communication with the agency had become cloudy.

‘Cloudy’ was not the right word. He was expressing his annoyance at their incompetence and the unsatisfactory outcome of their conversations. In that context the use of the word ‘cloudy’ did not fit the point he was trying to make, and the characterisation of the relationship with the agency in those conversations; it was a word selection ill fitted to the state of affairs he was describing, but entirely acous-

atically fitted to the image of the first name of the missing chef that flashed through my mind at precisely that moment.

The word cloudy articulates acoustic properties of the name Claudia and acts to call out and detoxify the bad taste joke about Lawrence's disappearance being formulated by the reporter.

Goffman's detailed ethnographic observational studies explored the web of moral and normative expectations that tacitly inform face-to-face-conduct. He identified the kinds of interpersonal sensitivities that can destabilize an encounter, which he described as the "judgemental contingencies of the situation" (Goffman, 1967, p. 31), and in response to which we use various interpersonal strategies of avoidance, resistance, or management. Poetic confluence appears to be one such resource for management potential threats of face.

On a less granular level, it is a very robust feature of poetic confluence experiences that the poetic turns address and manage the sensitive or evocative elements of another's private thoughts by offering a more normal or less evocative alternative. Consider the cases we have discussed so far:

Revulsion at the image of a rat in a pub/'Ratted' (being drunk)

Esteemed academic embarrassingly leaves chalk in his ear/'Earmark'

Fires in the stands at a football stadium/'Burnt off'

Concern about a shooting/'Shoots around the flat'

Imagery of separating bones/'No bones about it'

Imagery of skiing injury/'SNAP'

Imagery of mushroom cloud/'Control the fallout'

Thoughts of the loss of a parent/'Bluey'

Anger at absent Frenchman/'Monsieur'

Failure to remember political colours/'Loyalist man'

Homophobic term, chutney ferrets/'Pickle'

Formulating a bad taste joke about a missing woman named Claudia/'Cloudy'

In other cases in my corpus, poetic turns offer normalized versions of thoughts about, or imagery relating to, sexual activity, new sexual relationships, personal anxieties, and unkind or inappropriate thoughts about co-interactants. There are numerous studies of ordinary conversational interaction that show how turns at talk can be designed to address extreme, traumatic, or exaggerated claims in such a way as to scale down the implied seriousness or import (Antaki, 2008; Drew, 1987; Heritage & Watson, 1979; Jefferson, 2005). Telepathic communication mediated in episodes of poetic confluence seems to perform a similar range of interpersonal actions but directed to unstated thoughts and images.

Discussion

In this paper I have developed an approach to an ostensibly telepathic experience based on principles of Conversation Analytic research on talk-in-interaction. Although this is not a CA analysis, I have made a case for the phenomenon by examining recurrent features across collections, which is a methodological step common to CA research. I have then examined three interactional functions of poetic confluence, which reflects CA's examination of talk as a form of social action. Not all cases of poetic influence perform all actions; for example, there are fewer cases of poetic confluence restoring an interlocuter's attention to the interactional moment after a period of mind wandering than there are cases in which poetic turns call out and normalize internal preoccupations on evocative or sensitive matters.

There are several skeptical responses. The most compelling is that we cannot be sure how well these written accounts capture the actual dynamics of the interaction they relay. Moreover, we know talk and texts do not merely represent a factual world out there, but have a constitutive and constructive focus (Potter, 1996; Potter & Wetherell, 1987; Wooffitt et al., 2021a). Furthermore, there are culturally based conventions for reporting unusual experiences (Neisser, 1982). There is, then, the danger of mistaking patterns in reporting for patterns in the social interaction they report. These are serious issues. Although the consistency in the structure of

the accounts goes some way to mitigating these concerns, it remains difficult to disentangle the mechanisms for reporting and the events reported.

It might be objected that once having been introduced to the phenomenon people then mistake everyday coincidence for something more intriguing because they are primed to interpret events as being examples of poetic confluence. From personal experience, I have not found this to be the case. I permanently monitor my own life for further cases, but that predisposition has not led to a glut of cases. I have not had an experience for several years.

The recurrent properties of the experience suggest that these are not coincidences. Moreover, reports of poetic confluence experiences have different discourse features than accounts of coincidences (Stockbridge, 2017; Stockbridge & Wooffitt, 2019). People routinely send me accounts of experiences which they think might be the kind of event I am studying, but they are not. These are recognizably mere coincidence, without any of the key features that have been identified in this paper. It is relatively simple to distinguish between accounts of coincidence and poetic confluence.

In his account of ESP puns, Schegloff (2003) addressed his own explicit skepticism about the phenomenon, writing: “If there is a real phenomenon here, and if the exemplars [the candidate instances described in his paper] are apt and well chosen, it is their cumulative effect which will render the phenomenon visible, and by no means unthinkable” (p. 539).

There are recurrent features across my corpus and the collections presented in Hollós (1933) and Schegloff (2003). The consistencies are in cases that date back to the 1920s and in cases collected from the 1970s to the present day. These consistencies come from instances that occurred in Europe and North America, and were experienced in German and in British and American English. There is a case, then, that the cumulative effect requirement proposed by Schegloff has been met historically, cross-culturally, and linguistically

The approach developed here is not parapsychological. It does, however, connect with themes in parapsychological research. In many cases there is a clear metaphorical dimension to the relation between thought and utterance. As Cardena (2019) has observed, this metaphoric, often playful association is common to para-

psychological research using free response experimental design, and he draws clear links to work on telepathic associations in dreams. He proposes more broadly that metaphorical associations may be central to the porousness of self suggested by everyday psi related experiences. The phenomenon of poetic confluence also resonates with Carpenter’s First Sight theory (Carpenter, 2012). Carpenter makes the case that unconscious psi mechanisms are fundamentally implicated in mundane cognitive processes. He thereby identifies the everyday as an environment in which psi processes may occur. His work is highly theoretical and is based on evidence from the literature of experimental psychology and parapsychology. But if everyday life is unavoidably underpinned by what he terms personal unconscious preconscious processes, then we should expect to see those processes implicated in everyday social interaction, from the technical requirements of turn transfer to the management of interpersonal relations.

This suggests several avenues for further research. Poetic confluence seems to be a moment of enigmatic relationality mediated by mundane process of social interaction, such as turn transfer, word selection, and turn design. But the processes of talk-in-interaction are extraordinarily complex and it may be that everyday psi is implicated in, or facilitated by, other sequentially organized episodes. Further analysis will have to move beyond anecdotal reports to focus on actual recordings of the talk which are associated with poetic confluence (or other forms of seemingly mysterious connection). Given the unavoidable introspective component of poetic confluence, collecting that kind of data presents significant challenges, requiring recordings of spontaneous events and subsequent interviews with the person whose imagery was apparently captured in another’s ill-formed and incidental turn. But it would allow a sociological contribution to research on the conditions under which psi phenomena manifest in everyday life.

Skeptics often reject the possibility of telepathic communication because it cannot be accounted for in our current understanding of physics and biology. Poetic confluence, however, fits perfectly with what we know about the socially organized properties of talk-in-interaction. Poetic confluence works to ensure mutual attention for orderly turn transfer; it is a vehicle for affiliation and alignment; and it a mechanism by which sensitive imagery or thoughts can be reformulated and normalized. These are the kinds of interpersonal concerns and social actions that are routine in everyday talk. Sociologically, then, poetic confluence is an anomaly that is not

anomalous, as it accords with what we know about how social interaction works, and the relationships negotiated through talk.

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Sleep Paralysis and Extraordinary Experiences¹

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Abstract: We investigated sleep paralysis (SP) with an online questionnaire. Our sample consisted of 380 participants who experienced at least one SP. In this paper, we present the relation of SP to extraordinary experiences, paranormal beliefs, and absorption. We used a German questionnaire, *Fragebogen zur Phänomenologie außergewöhnlicher Erfahrungen* (PAGE-R-II), to assess the extent to which people with SP have had other extraordinary experiences, a German translation of the *Belief in the Supernatural Scale* (BitSS), and a German version of the *Tellegen Absorption Scale* (TAS). Our hypotheses regarding a positive correlation between the frequency of SP and certain forms of extraordinary experiences, paranormal/supernatural beliefs, and absorption were only partially confirmed. We found an expected significant correlation between the frequency of SP and the expression on the PAGE dimensions "Dissociation" and "External," but not between SP frequency and the other scales. The group (55%) reporting paranormal experiences during SP had highly significant higher mean scores on the PAGE, BitSS, and TAS. There were also significant correlations between the applied scales and specific hallucinatory perceptions and emotions, which leads us to believe that two main types of experiencing SP may exist: one mainly connected with typical negative emotions and a more external focus of experience, and another characterized by positive emotions and more internally experienced perceptions. This hypothesis requires further investigations.

Keywords: sleep paralysis, paranormal beliefs, absorption, extraordinary experiences, paranormal experiences, anomalous experiences, hallucinations, REM sleep

Highlights

- The frequency of sleep paralysis (SP) episodes is highly correlated with the frequency of other specific extraordinary experiences outside of SP.

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- There were no significant correlations between the frequency of SP episodes and supernatural beliefs and absorption.
- Participants who reported many extraordinary experiences in general tended to interpret some experiences during SP as paranormal.
- Our evidence leads to the hypothesis of two types of experiencing SP: one mainly connected with typical negative emotions and a more external focus of attention, and another characterized by positive emotions and associated with more internally experienced perceptions of the vestibular-motor kind.

Isolated sleep paralysis (SP) is a phenomenon that usually occurs while falling asleep or waking up. The affected person is in a waking state but cannot move. In sleep medicine, SP is classified as a REM-related parasomnia (American Academy of Sleep Medicine, 2014). As in narcolepsy, in which SP occurs as an accompanying symptom, isolated SP is thought to be directly connected with REM sleep. Mahowald and Schenck (2005, p. 1279) point out that the investigation of sleep disorders has led to important basic assumptions about the general nature of sleep, including the ideas that sleep may not be a global, but rather a local, brain phenomenon, and that wakefulness, NREM sleep and REM sleep are not mutually exclusive states (see also Leschziner, 2019). The assumption is that it occurs because of a desynchronization of physiological characteristics of REM sleep (muscular atonia) and the state of consciousness (waking) (Sharpless & Doghramji, 2015). There are records of this kind of experience from early testimonies of human culture and almost all ethnic groups (Adler, 2011, pp. 8–58; Sharpless & Doghramji, 2015, pp. 17–54). This suggests that SP is a phenomenon with a culture-independent experiential basis (Hufford, 1982). The definition of isolated SP (i.e., not as a symptom of narcolepsy) is a sleep-related, paralytic sensation combined with waking consciousness. Research shows an unclear picture of lifetime prevalence because of lack of standardized surveys. Sharpless and Barber (2011) estimated a lifetime prevalence of about 8% for the general population. However, the numbers vary considerably depending on the population group and ethnicity. In an African sample, the prevalence was 40% of the general population and 31% in the Asian general population. In student samples, it was consistently above 30% (Sharpless & Barber, 2011).

SP, usually experienced as very unpleasant and anxiety-producing, can be accompanied by perceptions understood as hallucinations from the perspective of conventional medicine. According to Sharpless and Doghramji (2015, pp. 76–83) about 80% of all SP experiences are accompanied by such hallucinations, divided into four categories:

- auditory hallucinations (e.g., humming, hissing, hearing voices, screams, scratching noises),
- perception of a presence (“sensed presence”; the intense feeling of a presence in the room, mostly perceived as malignant, along with a feeling of an acute threat to one’s own security),
- tactile and kinesthetic hallucinations (perception of heat or cold, pressure or weight, classically on the chest, but also on other parts of the body; feelings of being touched, sometimes even strangled; feelings of falling, flying, hovering, or turning),
- visual hallucinations (perception of objects and entities of various kinds: animals, demons, ghosts, humanoid entities, aliens, “shadow people”).

Factor analyses on SP hallucinations by Cheyne and colleagues revealed three broad categories: the *Incubus* (pressure on chest, feeling suffocated); the *Intruder* (sensed presence, visual, auditory, and tactile hallucinations); and the *Vestibular-Motor* (tingling, feelings of floating, flying, out-of-body experiences, and the like) factors (Cheyne, Newby-Clark, et al., 1999; Cheyne, Rueffer, et al., 1999; Cheyne, 2005). The first two factors are highly correlated, while their correlations with the third one are moderate (Cheyne, Rueffer, et al., 1999).

The often bizarre and disturbing quality of the experience, the lack of well-known cultural patterns of interpretation in Germany, and the accompanying somatic and mental circumstances place SP experiences into the realm of extraordinary experiences and altered states of consciousness, often interpreted as an indication of the paranormal (Cheyne, Newby-Clark, et al., 1999; Hufford, 1982, 2005; Jalal et al., 2020; Sharpless & Doghramji, 2015, pp. 17ff.).

We consider SP to be an extraordinary, or exceptional – both terms are used synonymously – experience (ExE). The definition of ExEs is difficult. Belz and Fach (2015) define them as “deviations from what might be



referred to as ordinary experiences consistent with the reality-model that individuals develop to cope with their inner and outer world. ExE serves as an umbrella term for occurrences that are labeled as paranormal, psychic, spiritual, transcendental, supernatural, magic, etc.” (p. 365). However, the deviations that characterize ExEs do not necessarily concern the reality-model but primarily the realm of everyday experiences (see Mayer & Schetsche, 2019, for details). Anomalous experience is another term also broadly used synonymously to ExE. We follow Cardeña, Lynn and Krippner’s definition of an anomalous (or extraordinary, or exceptional) experience “as an uncommon experience (e.g., synesthesia), or one that, although it may be experienced by a significant number of persons (e.g., psi experiences), is believed to deviate from ordinary experience or from the usually accepted explanations of reality according to Western mainstream science” (Cardeña et al., 2014, p. 4). Furthermore, we consider SP to take place in an altered state of consciousness (ASC) (cf. *ibid.*, pp. 4–5). Not all ExEs have to take place in ASC. Déjà-vus, for example, are experienced during the ordinary waking state. SPs, on the other hand, are clearly related with falling asleep, waking up, or drowsiness. It is crucial to understand that sleep paralysis as such (i.e., the atonia during REM sleep) is far from being extraordinary or unexplained. What is extraordinary is the “the juxtaposition of the atonia and dream imagery (i.e., hallucinations) of REM sleep with wakefulness” (Sharpless & Doghramji, 2015, p. 140) and thereby the experience of the paralysis (cf. Adler, 2011, p. 79).

It is not surprising that SP experiences are assumed by many Western scientists to be one of the sources and causes of human belief in ghosts because of these special properties (e.g., Hufford, 2005). SP are also closely linked to out-of-body experiences (Blackmore, 1999; Hufford, 2005; Raduga et al., 2020), lucid dreams (Denis & Poerio, 2016), and encounters with aliens (Blackmore, 1998; Clancy, 2005) and other entities (Sharpless & Doghramji, 2015). Thus, there is a particularly close connection between SP, extraordinary dreams (including lucid dreams and false awakenings), out-of-body experiences, sleep-related hallucinations, and alien abduction experiences. These experiences are not only similar in terms of their context of occurrence (all of them can be sleep-related), but they can be easily confused with each other and even partially merge into each other. There have been different attempts to explain the underlying mechanisms for these correlations. The neurophysiological basis is that NREM sleep, REM sleep, and waking consciousness are not mutually exclusive (Mahowald & Schenck, 2005; Terzaghi et al., 2021). In addition to the fact that the conflicting information

resulting from the intermingling of REM dream content, paralysis, and waking consciousness may lead to cognitive dysfunction, the frightening quality of SP may lead to OBEs as dissociative reactions to maintain identity integrity (Blackmore, 1982, pp. 240–252). Denis and Poerio pointed out that both SP and lucid dreams, “can be conceptualized as dissociated rapid eye movement (REM) states” (Denis & Poerio, 2016: 38). This seems to explain well the correlation and the reported transitions from one state to another. Reports of alien abductions have many similar elements to reports of SP episodes, such as perception of gray figures, strange body sensations, inability to move, OBEs, and intense fear (Clancy, 2005), which may explain the reported correlations.

The relation between SP and ExEs has been rarely studied systematically. From a sleep medicine perspective, the specific quality of the experiences is considered hallucinatory and harmless. Cultural studies approaches to SP provided interesting data on historical and culture-dependent as well as culturally independent aspects of this phenomenon (Adler, 2011; Hufford, 1982; Jalal et al., 2014, 2015; Sharpless & Doghramji, 2015, Yoshimura, 2015). Sceptically oriented papers presented SP as a conventional explanation for some sorts of paranormal beliefs and ExEs such as alien abductions (Blackmore, 1998; French, 2009). Belz and Fach (2012, 2015) took a different approach by including SP as a specific ExE among others in their model of fundamental categories of exceptional phenomena. They developed a category system based on their understanding of ExEs as deviations in the affected person’s model of reality. They theoretically derived four classes of ExEs, assigned to the four quadrants formed by the dimensions “external–internal” and “coincidence–dissociation.” Note that the term dissociation is not used in a clinical sense but phenomenologically. It describes the separation of things that belong together and means psychophysical dissociations such as out-of-body experiences, automatisms, and paralyse. In contrast to “external” and “internal” phenomena, “coincidence” and “dissociation” do not describe extraordinary phenomena per se, but rather relations between phenomena experienced as extraordinary (*ibid.*, pp. 371). Belz and Fach arrange the two dimensions orthogonally, creating a field of four quadrants. ExEs can be assigned to these quadrants based on their specific characteristics. In their model, SP is placed in the quadrant built by the external and the dissociation poles, i.e., experienced as external and disconnected from normal body function. This classification, validated with cases from their counseling practice as well as with four other samples (Fach, 2018), can be tested with a selected sample of SP experiencers to provide insights into the nature of SP in relation to other ExEs.

In the field of ExEs, the question of the relation between personal or culturally mediated beliefs and subjective experiences is of central importance. Do experiences lead to beliefs or are certain beliefs necessary to have corresponding experiences? Experiences have to be culturally encoded in order to be communicated. Which ExEs or phenomena can be reported at all, in which terms, and on what basis of interpretative framework is therefore always dependent on cultural discourses that deal with the accepted order of reality (Mayer & Gr nder, 2011). SP as an experience was considered entirely dependent on a cultural interpretive framework before David Hufford found a new understanding of the SP and published a seminal book on his findings (Hufford, 1982). He challenged the prevailing *cultural source hypothesis* of the time, which considered culturally transmitted ideas and narratives to be the source of, for example, belief in ghosts. His research on SP led him to the *experiential source hypothesis*, which assumes certain experiences, such as those typically made during SP, as an important cause for the culturally independent development of belief in ghosts. The two hypotheses are not mutually exclusive but explain different sub-aspects of experiences and accounts. Questions about the expression of supernatural beliefs and certain personality traits associated with ExEs can provide valuable clues to better understand SP, how it is interpreted by individuals, and how this may be influenced by, or influence, personal beliefs.

Previous studies on the correlation of paranormal beliefs and the occurrence and frequency of SP have yielded inconsistent findings (Denis & Poerio, 2016; Denis et al., 2018). Considering that a connection between SP experiences and the development of belief in ghosts is claimed, the investigation of a possible connection between belief in paranormal and SP is obvious. It seems a better strategy is to examine this question not by distinguishing a group with SP from a control group without SP, but by a correlation with the frequency of SP (a person who experiences SP only once may be more like the control group without SP than the group with frequent SP in terms of potential development of paranormal beliefs). SP can also be part of more complex events, such as a poltergeist case involving a number of different paranormal phenomena, as reported by Hufford (1982, pp. 172ff.). Therefore, an exploratory investigation into paranormal events associated with SP is of interest.

Absorption is a personality trait that plays a special role in connection with ExEs, e.g., out-of-body experiences and apparitions (Carde na & Alvarado, 2014; Holt et al., 2012; Irwin, 1985; Irwin & Watt, 2007; Kerns

et al., 2014). Both kinds of experiences are considered to be part of the phenomenology of SP (Hufford, 1982). Absorption is associated with openness to experience enabling a person to become absorbed in their mental imagery and fantasy (Roche & McConkey, 1990). The question is whether people with higher levels of absorptive capacity are more likely to experience SP and whether the experiences are richer than those with lower levels on the absorptive scale. Previous studies found a positive correlation between SP and absorption, although the data base is thin (Abrams et al., 2008; Li skov  et al., 2016; McNally & Clancy, 2005).

We conducted an extensive online survey of SP targeting a number of objectives. Many previous studies on SP have distinguished only between individuals with and without SP, without considering the frequency of these experiences. This significantly limits the validity of such examinations, because many affected persons experience SP only rarely or even only once (Sharpless & Doghramji, 2015, pp. 93ff.). We limited our sample to individuals with at least one SP experience. In addition, we were interested in “classical” research questions on SP, i.e., phenomenological aspects in relation to frequency and gender, as well as comorbidities. The results of this first part of the evaluation, some of which are highly descriptive, are published in Mayer and Fuhrmann (2021). Furthermore, our interest was in coping strategies with these experiences. This part of evaluation will be the topic of another paper. Large parts of the qualitative data are still awaiting analysis.

We hypothesized positive correlations between the frequency of SP and the experience of “External Phenomena” and “Dissociation Phenomena,” according to the classification of Belz and Fach (2015). We also expected higher absorption scores in individuals with more frequent SP and a positive correlation between beliefs in the paranormal and the frequency of SP. In addition to these hypotheses, we exploratorily examined possible connections between these constructs and other aspects of SP such as experienced perceptions, feelings and emotions during SP, and their interpretations.

Method

Participants

Our data pool consisted of 55 questionnaires from one sample, (FB) and 325 from another (GW). Sociographic data on age, gender, education, living situation, and religiosity were evaluated through 11 questions: 44% of the

participants were female, and 56% male. The mean age was 39 years (SD = 12.42; range from 18 to 77 years) with no significant gender difference. The level of education of the respondents was rather high: 57% had a German Fach-/Hochschulabschluss [university and/or a technical college degree], 26.5% a German Realschulabschluss [secondary school certificate], and only 9.5% a German Hauptschulabschluss [basic school qualification]. Almost 68% were employed, about 10% were students or undergoing professional training, 7% were retired, and 5.5% were unemployed or unable to work; 63% lived with a permanent partner, and 37% lived without. 35.5% of the sample endorsed an unbound spirituality or religion, 25% declared themselves Christians. 25% atheists, and another 19.5% agnostic.

Measures

Sleep paralysis. SP is an experience, not a personality trait or behavior. SP questionnaires are therefore geared towards a phenomenological survey of the phenomena experienced and the accompanying circumstances. Two questionnaires are mostly used and have served as the basis for many subsequent questionnaire studies. Cheyne and his team developed the *Waterloo Sleep Experience Survey* (WSES, Cheyne & Rueffer, 1999) with 27 items, which several other surveys refer to. Paradis et al. (2009) put the *Unusual Sleep Experiences Questionnaire* (USEQ) with 43 items together. We created our own questionnaire by taking items from these two questionnaires and adding some items of our own, given our emphasis on interpretation, coping strategies, and paranormal aspects. We did this because neither questionnaire offered the exact combination of items we needed to investigate our questions. We translated the items of these two questionnaires into German using some slightly different item wording to make the questionnaire homogeneous (Mayer & Fuhrmann, 2021). Our questionnaire on SP consisted of 35 items. Several items were supplemented with a field for a free text commentary. Thus, we got also qualitative data. The introductory question was: *Have you ever had the experience when you wake up or when you fall asleep, including before or after a nap, that you cannot move and feel paralyzed, although you were aware of your surroundings and felt awake?* (All translations made by the authors). With a free text field following the question *Please describe your strongest and most impressive experience of this kind in your own words*, we were able to assess whether the participants' experiences actually met the definition criteria of sleep paralysis.

Extraordinary experiences. We used a newly revised version of the German *Fragebogen zur Phänomenologie außergewöhnlicher Erfahrungen* (PAGE-R-II, in press; see Fach et al., 2013, for the first, longer version) to investigate the extent to which people with SP have had other ExEs. This questionnaire consists of 20 items covering experiences of supposedly paranormal phenomena, such as apparitions, telepathy, clairvoyance, premonition, and precognitive dreams, but also phenomena like strange perceptions (e.g., hearing inner voices), cognitions (e.g., thought intrusions), and automatisms (e.g., spontaneous and uncontrolled body movements). These items are assigned to the above-mentioned categories formed by the internal–external and coincidence–dissociation dimensions and measure the frequency of these experiences on a five-point scale ranging from “never” to “often.” The internal consistency of the PAGE-R-II is very good on the global scale (Cronbach's $\alpha = .86$ to $.89$, depending on the sample), good or satisfactory on the subscales ($\alpha = .66$ to $.84$, depending on the subscale and the sample) (Fach, 2022).

Paranormal and Supernatural Beliefs. While the PAGE-R-II asks about experiences, the Belief in the Supernatural Scale (BitSS; Schofield et al., 2018) measures corresponding beliefs. This recently developed scale avoids some problems with the Revised Paranormal Belief Scale (rPBS; Tobacyk, 2004) by making a better distinction between religious, supernatural, and paranormal beliefs. We translated the scale into German. It has a five-factor structure composed of “mental and psychological phenomena,” “religious beliefs,” “psychokinesis” (psychically affecting matter), “supernatural beings,” and “general paranormal perceptions” and consists of 44 items with a seven-point scale assessing agreement with the statements ranging from “strongly disagree” to “strongly agree.”

Absorption. We used a German translation (Ritz et al., 1993) of the Tellegen Absorption Scale (Tellegen & Atkinson, 1974) to measure the personality trait absorption. This questionnaire includes 34 items with a five-point scale measuring agreement with the statements ranging from “is not true for me” to “is completely true for me.”

Procedure

A link to the online questionnaire was placed on different websites. The first sample was obtained via several Facebook (FB) groups, mainly a closed FB group “Schlafparalyse” (“sleep paralysis”) between mid-

April and July 2018. The second was obtained via the website “Grenzwissenschaft aktuell” (GW), which provides current news from anomalistics (border areas of psychology and parascience), in July 2018. The questionnaire was presented as “You may have experienced not being able to move when you fall asleep or wake up, as if you were paralyzed. This experience is not as unusual as you might think. The phenomenon described here is sleep paralysis or sleep paralysis (SP)” to then describe SP and present the authors of this paper. Data collection was carried out using the online questionnaire tool LimeSurvey. The data was collected using pseudonyms. Only the IP was recorded to weed out any duplicate data records. Participants provided informed comment and had the opportunity to make comments. The study was approved by the local Ethics Committee of the Institute for Frontier Areas of Psychology and Mental Health (IGPP-2021-03).

Analysis

We used SPSS (version 27) and depending on the research question, we selected the entire ($N = 380$) or a reduced sample ($N = 316$) of those participants with at least three SP experiences as the basis for statistical calculations. The latter we did with items which inquired about changes in experiences, their interpretation, reactions, and attitudes. Most of our measures allowed only Spearman’s rank-order correlation tests, so we calculated Spearman’s r for all correlations. The Mann-Whitney non-parametric U -test was used for group comparisons. We performed two-sided significance tests because many of the previous findings were inconsistent, and agreed to a significance level of .05.

Results

SP and ExEs in General

Many of the perceptions and sensations during an SP episode are part of the spectrum of ExEs recorded by the PAGE. A positive correlation between the frequency of SP episodes using seven options (see Mayer & Fuhrmann, 2021) and the global score of the PAGE was confirmed (Table 1). The categorization of Belz and Fach places SP into the quadrant built by the poles “external phenomena” and “dissociation phenomena.” Therefore, we expected a significant correlation of SP frequency with these two subscales, which was confirmed. The results suggest that the experience of SP cannot be limited to the quadrant of dissociative and exter-

nal phenomena as it is assumed by Belz and Fach. In particular, those with a higher frequency of SP tended to experience more internal phenomena.

Table 1

Correlations Between Frequency of SP and PAGE-II-R ($N = 380$)

	SP
PAGE global scale	$r = .21^{***}$
External phenomena	$r = .14^{**}$
Internal phenomena	$r = .17^{***}$
Coincidence phenomena	$r = .06$
Dissociation phenomena	$r = .33^{***}$

$p \leq .01^{**}; p \leq .001^{***}$

SP is often accompanied by specific perceptions. Our questionnaire asked how often participants experienced the following (types of) perceptions during SP: pressure on the chest or other parts of the body, the feeling of suffocation or being choked, auditory hallucinations, visual hallucinations, a sensed presence, the feeling of being touched, experience of rape (e.g., by a “demon”), tingling, numbness or vibration in one or more parts of the body, the sensation of hovering, flying, falling, spinning, erotic sensations, and the feeling of leaving the body and/or looking down at one’s own body from above (“out-of-body experience”). We assigned these perceptions to the three SP hallucination factors Incubus, Intruder, and Vestibular-Motor (V-M), according to the model by Cheyne and collaborators (Cheyne, Rueffer, et al., 1999), which we were able to reproduce in our factor analysis. The two items “experience of rape” and “erotic sensation,” not included in Cheyne et al.’s factor analysis, were assigned to the Incubus factor in a 3-factor model. The correlations between the three factors found in the original study were largely confirmed in our study. All of them were moderately correlated, with the highest correlation between the Incubus and Intruder factors. Cheyne, Rueffer, et al. concluded from their results “that Intruder and Incubus together constitute a superordinate factor consistent with a narrative of nocturnal assault by a malevolent agent” (ibid., p. 328). However, further exploratory analyses led us to continue with a 4-factor model proposed by factor analysis, which confirms the three factors found by Cheyne, Rueffer et al. and the two added items form a separate factor *Sexuality and Sexualized Violence*.

There were moderate to large correlations with all PAGE subscales (Table 2). This is not surprising as the variety of extraordinary perceptions during SP suggests so. A more interesting picture emerges when the magnitude of the correlations is considered against the background of Belz and Fach's model, which assigns SP to the "External" Dissociation" quadrant. Although the Intruder experience fits this model, we could only determine this to a limited extent for the Incubus factor and not at all for the V-M factor. The correlation with the "Dissociation" subscale ($r = .41$) was higher than with the other subscales but the difference of the correlations of Incubus/External ($r = .3$) and Incubus / Internal ($r = .25$) is low (Fisher's $z = .67$, $p = .5$). There were no significant differences in the correlations between the V-M factor and the PAGE subscales.

Table 2

Correlations Between SP Hallucination and PAGE-II-R Subscales (N = 380)

	Incubus	Intruder	Vestibular-Motor	Sexuality and Sexualized Violence
External phenomena	$r = .5^{***}$	$r = .5^{***}$	$r = .30^{***}$	$r = .19^{***}$
Internal phenomena	$r = .2^{***}$	$r = .3^{***}$	$r = .36^{***}$	$r = .22^{***}$
Coincidence phenomena	$r = .18^{***}$	$r = .24^{***}$	$r = .30^{***}$	$r = .15^{**}$
Dissociation phenomena	$r = .37^{***}$	$r = .56^{***}$	$r = .36^{***}$	$r = .23^{***}$

$p \leq .01^{**}$; $p \leq .001^{***}$

SP and Belief in the Supernatural

Previous research on the relation between SP and paranormal beliefs yielded inconsistent results (Denis et al., 2018). Denis & Poerio (2016) reported a weak but significant positive correlation ($r = .06$; $p < .05$) between the frequency of SP and paranormal beliefs as measured with the rPBS (Tobacyk, 2004). Accordingly, we hypothesized a positive correlation to BitSS scores (Schofield, et al., 2018) but could not find any in the global scale or in the subscales. The frequency of SP episodes seems not to be influenced by the kind of beliefs measured by the BitSS and/or vice versa.

Examination of the association between religious, supernatural, and paranormal beliefs and experienced symptoms of SP revealed some weak but significant correlations with both the "Supernatural Entities" and the "Common Paranormal Perceptions" subscales. The first includes the belief in ghosts, demons, angels, divine beings, the devil, etc., and the latter belief in the efficacy of astrology, card readings, psychics who can predict

the future, haunted buildings, etc. (see Table 3). These two subscales could be assigned to the field of esoteric or somehow alternative worldviews. Traditional religious beliefs and beliefs in psi phenomena such as psychokinesis and extrasensory perception correlated least with SP hallucination factors.

Table 3

Correlations between SP Hallucination Factors and Belief in the Supernatural (N = 380)

	Incubus	Intruder	Vestibular-Motor	Sexuality and Sexualized Violence
BitSS (global)	$r = .05$	$r = .04$	$r = .10$	$r = .04$
BitSS – Mental and Psychic Phenomena	$r = .03$	$r = .02$	$r = .18^{**}$	$r = .05$
BitSS – Religious Beliefs	$r = .02$	$r = -.03$	$r = .02$	$r = .00$
BitSS – Psychokinesis	$r = .04$	$r = .04$	$r = .09$	$r = .05$
BitSS – Supernatural Entities	$r = .08$	$r = .14^{**}$	$r = .13^{**}$	$r = .05$
BitSS – Common Paranormal Perceptions	$r = .11^{*}$	$r = .13^{**}$	$r = .15^{**}$	$r = .11^{*}$

$p \leq .05^{*}$; $p \leq .01^{**}$

SP and Absorption

We expected a positive correlation between the frequency of SP and absorption based on a few previous findings in SP research but also because absorption is linked to several anomalous experiences (see Cardena et al., 2014), but found no significant correlation with TAS scores, $r = .10$, $p = .054$. A somewhat different picture emerged when the correlations between TAS and the three SP hallucination factors are considered. Here we found small to moderate significant correlations, $r = .17$, $p \leq .001$ with Incubus, $r = .29$, $p \leq .001$ with Intruder, $r = .33$, $p \leq .001$ with Vestibular-Motor, and $r = .13$, $p \leq .05$ with Sexuality and Sexualized Violence. The highest correlation was between TAS and the V-M type. Incubus type experiences are associated with strong bodily sensations, which are very different from vestibular-motor bodily sensations. Absorption mainly targets mental processes, which seem to fit better with the latter.

Table 4 shows that at the level of single experiential phenomena the highest correlation of the TAS was with out-of-body experiences (OBEs). With the exception of this correlation, we found only weak correlations, but most of them highly significant. The "experience of rape" and "erotic sensation" were reported least frequently. The correlations found should therefore be treated with caution. The most remarkable result besides the correlation to OBEs is the non-significant and almost not-existent positive correlation between the TAS score

and the symptom “feeling of suffocation or being choked.” In a sense, these two experiences (the latter and OBEs) could be understood as poles of the dimension of body-relatedness or physicality of the symptoms on the list.

Table 4

Correlations between TAS and SP Experiential Phenomena (Multiple Entries Possible) (N = 380)

	% Participants	Spearman's <i>r</i>
Pressure on the chest or other parts of the body	62%	.18***
Feeling of suffocation or being choked	43%	.07
Auditory hallucinations	65.5%	.18***
Visual hallucinations	64%	.15***
Sensed presence	79%	.19***
Feeling of being touched	57%	.14**
Experience of rape (e.g., by a 'demon')	13%	.09
Tingling, numbness or vibration in one or more parts of the body	6.5%	.17***
Sensation of hovering, flying, falling, spinning	55%	.19***
Erotic sensation	17%	.11*
Feeling of leaving the body and/or looking down at one's own body from above ('out-of-body experience')	49%	.31***

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

Feelings and Emotions During SP

Our questionnaire asked about the frequency of specific feelings or emotions during SP, on a five-point scale from “never” to “always” (see Table 5). The main emotions were different types of fear and feeling powerless. Only 9% of participants reported never feeling any type of fear and 33.2% did not feel powerless during SP (see Mayer & Fuhrmann, 2021 for details).

We found many highly significant correlations between PAGE scores and experiencing different emotions, with the highest ones for “fear of going crazy” and “fear of dying.” The only emotion that did not correlate to the PAGE global score is the “sense of powerlessness.” This is interesting because it is also the only one without a significant positive correlation to the frequency of SP episodes. One could speculate whether this feeling represents a very basal experience of SP that hardly depends on personality differences or differences in experience.

There were also several high correlations between TAS score and emotions or feelings during SP as can be seen in Table 5. The two highest ones were to “sense of sadness,” and the “feeling of going crazy.” There were no significant positive correlations between the global BitSS score and emotions or feelings. Individual religious, supernatural, or paranormal beliefs seem to have no effect on emotional experiences during SP episodes or vice versa.

Although we obtained an overall homogeneous picture, there are some notable individual results, such as the high correlation of PAGE coincidence and “sense of powerlessness,” uncorrelated with all other PAGE scales and TAS. Two of the listed emotions, “feeling of happiness” and “sense of curiosity,” are positively connoted. Both had a highly significant positive correlation to PAGE “Internal” but were not significantly correlated to PAGE “Dissociation” and only weakly with PAGE “External.” The two latter PAGE scales are typically linked with SP according the model of Belz and Fach (2015). This may indicate that there are two main types of experiencing SP: a “classic” one associated with anxiety and an external attentional focus, and another one with more inward focus, more often associated with positive feelings.

Table 5

Correlations Between Feelings and Emotions During SP and PAGE and TAS (N = 380)

	P global	P external	P internal	P coincidence	P dissociation	TAS
Fear of going crazy	$r = .31$ ***	$r = .26$ ***	$r = .24$ ***	$r = .17$ ***	$r = .3$ ***	$r = .23$ ***
Fear of dying	$r = .26$ ***	$r = .23$ ***	$r = .18$ ***	$r = .16$ **	$r = .23$ ***	$r = .17$ ***
Other fears	$r = .16$ **	$r = .12$ *	$r = .11$ *	$r = .07$	$r = .24$ ***	$r = .08$
Sense of sadness	$r = .22$ ***	$r = .14$ **	$r = .2$ ***	$r = .18$ ***	$r = .21$ ***	$r = .23$ ***
Feeling of anger / rage	$r = .18$ ***	$r = .08$	$r = .17$ ***	$r = .06$	$r = .26$ ***	$r = .04$
Sense of powerlessness	$r = .07$	$r = .01$	$r = .01$	$r = .13$ **	$r = .07$	$r = .08$
Sensation of pain	$r = .22$ ***	$r = .18$ ***	$r = .21$ ***	$r = .11$ *	$r = .22$ ***	$r = .14$ **
Feeling of happiness	$r = .16$ **	$r = .12$ *	$r = .22$ ***	$r = .12$ *	$r = .09$	$r = .17$ ***
Sense of curiosity	$r = .13$ **	$r = .11$ *	$r = .21$ ***	$r = .04$	$r = .09$	$r = .15$ **
Other feelings	$r = .14$ **	$r = .04$	$r = .18$ ***	$r = .14$ **	$r = .09$	$r = .16$ **

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

This hypothesis was supported by the correlations of SP hallucination factors and reported positive emotions (Table 6). Both showed a highly significant correlation to the V-M factor and the Negative/Positive Sexual Experience factor, which were significantly higher than the correlations with the Incubus factor and the Intruder factor. Significance of differences of correlations between V-M factor and Intruder factor for “feeling of happiness”: $z = 2.76, p = .006$; for “sense of curiosity,” $z = 2.36, p = .018$. It is important to note that the highly significant positive correlation between positive emotions and the factor Sexuality and Sexualized Violence is due only to the item “erotic sensations” and not to the item “experience of rape.”

Table 6

Correlations between SP Hallucination Factors and Positive Emotions during SP (N = 380)

	Incubus	Intruder	Vestibular-Motor	Sexuality and Sexualized Violence
Feeling of happiness	$r = -.01$	$r = .1^*$	$r = .30^{***}$	$r = .29^{***}$
Sense of curiosity	$r = .03$	$r = .09$	$r = .26^{***}$	$r = .23^{***}$

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

To explore this hypothesis, we ran two factor analyses (principal component analyses, varimax rotation) with the reduced sample of participants with at least 3 SP experiences ($N = 316$). With this sample, we were able to use the frequencies of the experienced phenomena and emotions, which were available on ordinal scales, for the factor analyses (although an interval scale level is normally required for a factor analysis, we believe the procedure is justified, because considering the large N , the differences between the calculation with interval and ordinal scales are likely to be very small). With a first factor analysis, we reduced the 10 items of the list of “feelings and emotions” to 3 factors: the “Fear–Pain” factor consisting of the three items “fear of going crazy,” “fear of dying,” and “sensation of pain”; the “Happiness–Curiosity” factor including the 2 corresponding items; and the “Other Fears–Feelings” formed by “other fears,” “other feelings,” “sense of sadness,” “sense of powerlessness,” and “feeling of anger/rage.” We then computed a factor analysis on the hallucination factors, the emotion factors, the four subscales of the PAGE, and the TAS. We got a 3-component solution. As seen in table 7, loadings of component 1 mainly result from PAGE and TAS scales; loadings of component 2 result from hallucination factors Incubus and Intruder and emotion factor Fear–Pain; loadings of component 3 result from hallucination factor Negative/Positive Sexual Experience and emotion factor Happiness–Curiosity. The interesting

point with respect to the thesis is that the V-M factor loads significantly on all three components, and equally on components 1 and 3. Both show a low loading of fear. Component 3 displays a high loading of Happiness–Curiosity, component 1 high loadings of PAGE internal, PAGE coincidence, and TAS. This suggests (at least) two general types of SP experiences as suggested above.

Table 7

Rotated Component Matrix

	Component		
	1	2	3
Incubus	.38	.70	.16
Intruder	.28	.68	.24
Vestibular-Motor	.42	.30	.42
Neg/Pos Sexual Experiences	-.01	.25	.74
Fear–Pain	.14	.74	-.06
Happiness–Curiosity	.22	-.35	.78
Other Fears–Feelings	.16	.47	-.12
PAGE external	.64	.33	.23
PAGE internal	.77	.21	.15
PAGE coincidence	.82	.09	-.02
PAGE dissociation	.47	.51	.18
TAS	.80	.09	.03
Explained variance	24%	20%	13%

Paranormal Experiences During SP

We asked our participants if they had experienced things that they would call “paranormal” in the absence of the notion of a natural explanation and 55% of the participants answered the question in the affirmative. There was a small but significant difference between the affirmative and non-affirmative group with respect to frequency of SP – more SP episodes related to more paranormal experiences ($z = -2.34, p = .02$), and a highly significant difference regarding all PAGE scores (for the global scale: $z = -8.62, p < .001$). Participants who reported many ExEs tended to interpret (some) experiences during SP as paranormal. There were also highly significant differences between the affirmative and non-affirmative group regarding their scores on all BitSS subscales (for the global scale: $z = -5.85, p < .001$) and the TAS scale ($z = -4.28, p < .001$). Higher scores of belief in the supernatural and absorption tended to lead to a paranormal interpretation of experiences during SP.

Participants could add a comment to the question about paranormal experiences during SP in a free-text field. We did not specify categories for paranormal phenomena because we could not expect a corresponding prior knowledge, and 56% ($N = 214$) used the free-text field for a description of the ExE interpreted as paranormal. We analyzed these texts and, if possible, assigned the mentioned phenomena to known parapsychological phenomenon classes, such as apparition, precognition, out-of-body experience, etc., as well as to the categorization of experiential symptoms commonly used in SP (auditory phenomena, visual phenomena, etc.). In some cases, the assignment could only be made based on the information in the introductory free-text question of the questionnaire (“Please describe your strongest and most impressive experience of this kind in your own words”) because reference is made to it or the comment alone was too unclear. Although most of the mentioned experiences could be considered hallucinatory from a neutral scientific perspective, the participants interpreted them as paranormal experiences. Table 8 shows the frequencies of different kinds of allegedly paranormal phenomena.

Table 8

Experiences During SP Interpreted as Paranormal

	Percentage
Apparition	28%
Auditory phenomena	20%
Out-of-body experience	18.5%
Sensed presence	15.5%
Tactile phenomena	15%
Visual phenomena	12.5%
Kinesthetic phenomena	12.5%
Psychokinesis	6.5%
Other reality	6.5%
Telepathy	2.5%
Precognition	1.5%
UFO / Alien Abduction	1.5%
Mind control	1%
Olfactory phenomena	1%
Other	1%

The categories are of course not mutually exclusive. “Apparitions,” for example, are visually perceived and thus also visual phenomena. Perceiving the room full of red light is a visual phenomenon, but not an apparition. If possible, we have assigned the reported phenomenon to the more specific category. Often more than one phenomenon was mentioned in the comments. The most reported phenomena were apparitions (28%) and auditory phenomena such as hearing voices, laughter, noises etc. (20%). Both belong to the most reported experiential symptoms of SP, together with “sensed presence.” The last-mentioned was experienced by 79% of the participants at least once; auditory hallucinations by 65.5%, and visual hallucinations by 63.5% (see Mayer & Fuhrmann, 2021, for details). It seems that visual experiences in the form of figures (human beings, dark grey figures, figures of other entities, etc.) during SP are most likely to lead to a paranormal interpretation: 49% of participants reported an OBE at least once and 18.5% interpreted it as paranormal. Experiences that can be assigned to the “classical” parapsychological categories were mentioned rarely.

Interpretation of the SP

We asked participants, whether they had heard of or knew about these or similar experiences before their own first SP experience, and whether they already had a name for this phenomenon, and 86% had not heard of it, and 91% did not know the term sleep paralysis. It is obvious that the interpretation and understanding of phenomena can change with increasing knowledge and experience. Two questions were about such changes: “Immediately after the first experience of this kind, what did you think it was, what caused it, and what was it related to?” and “If you feel differently about SP today, which of the following statements applies to your assessment today?” Table 9 shows that with increasing knowledge and experience supernatural interpretations as well as the fear that it is the expression of a mental and/or physical illness decreased. For many, this apparently leads to a de-dramatization of the experience. We can see that after the first experience only 10.5% interpreted the experience as SP, while at the time of the survey this was the case for 63%. However, more than a third still has a different interpretation.

Table 9*Interpretation of SP Experience After First Time and Currently (Percentages)*

	After 1st experience (%)	Current (%)
It was a dream	33.5	10
It was an apparition or another supernatural entity	28.5	18
It was an alien abduction	8.5	2.5
Something was physically wrong with me	29	7.5
Something was mentally wrong with me	23	12.5
It's related to a sexual abuse experience	1	1
It's related to a physical abuse experience	1.5	.5
It is related to the consumption of alcohol or other drugs	5.5	5
No clue	11.5	9
I didn't / don't think about it	5	3.5
It was a sleep paralysis	10.5	63
Other	17.5	15

There was a weak significant negative correlation between frequency of SP and prior knowledge of SP: Participants with few SP experiences were more likely to have foreknowledge of SP than those who experienced SP more frequently ($r = -.19, p < .001$). Consistent with this, they were much more inclined to interpret the first SP episode as sleep paralysis than were individuals with more frequent SP ($r = -.21, p < .001$).

Two anomalistic interpretations were on the list of causes for the paralysis experience, namely that it was caused by an apparition or another supernatural being, or by alien abduction. Both decreased significantly during the period between the first experience and the time of the survey. The alien abduction interpretation dropped down from 8.5% to 2.5%, and the apparition/supernatural entity interpretation from 28.5% to 18%. The latter interpretation was more consistent than the former and remained at a relatively high level (see Table 8). We examined our data in terms of the direction of changes in interpretation after the first time to the time of the survey: 7% of participants changed their interpretation from “alien abduction” to another item on the list, and 1% from another item to “alien abduction, with no significant correlation with frequency of SP; 18% of partic-

ipants changed their interpretation from “apparition/supernatural entity” to another item, and 7% in the other direction, in both cases, uncorrelated to prior knowledge of SP. There was a weak correlation with frequency of SP which becomes significant if we look at the reduced sample with at least three SP episodes, $r(314) = .12, p = .03$. A proportion of participants with more frequent SP tended to move from a conventional explanation or “not-knowing” position to a supernatural explanation of their experiences. This is a remarkable finding. However, no explanation can be derived from the data. A look into the qualitative data revealed that belief in ghosts and demons might play a role. The post hoc analysis indeed showed a significant difference in BitSS scores between the groups that changed the interpretation regarding apparitions or supernatural entities as the cause of the SP experience. Participants ($N = 380$) who changed their understanding toward being caused by such entities had significantly higher global BitSS scores than participants who changed their interpretation in the other direction, from caused by supernatural entities to a conventional cause, $z = -2.04, p = .04$; this difference is particularly clear for the subscale “supernatural entities,” $z = -2.79, p = .005$. Of course, no causal relation can be derived from this result. Belief in supernatural entities could support a supernatural interpretation of SP but the nature of SP experiences could also further or reinforce supernatural beliefs.

Gender Differences

There was a significant difference between males and females in terms of the mean scores of Incubus, $z = -4.67, p < .001$ and Intruder, $z = -3.89, p < .001$. Females estimated the duration of SP episodes to be longer on average and reported more phenomena (for details see Mayer & Fuhrmann, 2021). In addition, the females of our sample had higher mean scores on the global PAGE scale and on all subscales, as well as on the TAS scale. The relation between the TAS and SP hallucination factors revealed an interesting gender difference. Absorption was significantly correlated with the Intruder factor among males, $r(210) = .36, p < .001$, but not among females, $r(166) = .14, p = .070$. Females had higher scores on the BitSS subscales except for the “Religious Beliefs” subscale. The subscale “Common Paranormal Perceptions” showed a significant difference between males and females, the latter achieving higher scores (Table 10).

Table 10

Gender Differences ($m = 212, f = 168$) in PAGE, BitSS, and TAS scores (Females Had Higher Scores)

	Z
PAGE (global)	-2.97**
PAGE – External phenomena	-2.29*
PAGE – Internal phenomena	-1.67
PAGE – Coincidence phenomena	-3.75***
PAGE – Dissociation phenomena	-1.23
BitSS (global)	-2.21*
BitSS – Mental and Psychic Phenomena	-2.39*
BitSS – Religious Beliefs	-.37
BitSS – Psychokinesis	-1.82
BitSS – Supernatural Entities	-1.9
BitSS – Common Paranormal Perceptions	-5.16***
TAS	-4.22***

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

Regarding paranormal experiences during SP, only among males was there a significant difference between the group that answered in the affirmative to the item about paranormal experiences and the group that did not, $z = -5.12, p < .001, n = 212$. A gender difference was also seen for BitSS and PAGE scores. The general positive correlation between paranormally interpreted experiences and BitSS was much more pronounced among males than females: males (212), $z = -5.36, p = < .001$; females (168), $z = -2.7, p = .007$. The same is true for the PAGE scores, although the correlation is significant for both males and females (for the global PAGE score: males (212), $z = -7.43, p = < .001$; females (168), $z = -4.56, p < .001$ (Table 11).

Discussion

Belz and Fach's model places SP in the quadrant formed by external phenomena and dissociation phenomena. According to this model, we hypothesized higher positive correlations between SP frequency and scores on PAGE subscales "External" and "Dissociation" than on the other two subscales. This hypothesis was only partially confirmed. While we indeed found the highest correlation to the expression on the "Dissociation" pole, we could not find a significant difference between the correlations to the "External" and "Internal" poles. Together with some other findings from our study, these results suggest that the phenomenology of SP is more complex

Table 11

Experiences Interpreted as Paranormal – Group Differences Separated by Gender

	Males	Females
TAS	-5.12***	-.8
PAGE (global)	-7.43***	-4.56***
PAGE – External phenomena	-7.3***	-4.34***
PAGE – Internal phenomena	-5.65***	-3.91***
PAGE – Coincidence phenomena	-5.154***	-2.22*
PAGE – Dissociation phenomena	-5.76***	-4.089***
BitSS (global)	-5.36***	-2.7**
BitSS – Mental and Psychic Phenomena	-5.29***	-2.75**
BitSS – Religious Beliefs	-3.47***	-1.19
BitSS – Psychokinesis	-5.1***	-2.78**
BitSS – Supernatural Entities	-5.86***	-2.8**
BitSS – Common Paranormal Perceptions	-5.91***	-3.01**

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

than assumed in Belz and Fach's model. SP characterized by the V-M type and accompanied by positive emotions may have a stronger internal experiential quality, whereas Belz and Fach's model describes mainly the intruder and incubus type of SP with a strong association with experiences of fear, pain, and other negative emotions. It is important to keep in mind that the four PAGE scales are highly correlated with each other, i.e., a person with many ExEs usually has not only one quadrant occupied (in our sample the correlations between the PAGE scales are between $r = .48, .58$). SP is only one ExE of many. Synchronistic experiences experienced by many are located, for example, at the coincidence pole.

Additional hypotheses concerned paranormal and supernatural beliefs and absorption. Based on prior research, we expected a significant positive correlation with SP frequency in both cases, but did not find significant correlations with BitSS or TAS.

However, in exploratory analyses we found a positive correlation between absorption and the frequency of experienced phenomena during SP, grouped under SP hallucination factors. The highest correlations occurred with the V-M factor, and, at the level of single items, with out-of-body experiences. The latter is consistent with

previous research (Cardeña & Alvarado, 2014). Individuals with a high TAS score tend to experience more phenomena during SP, especially of the V-M type. One could interpret this to mean that the (neuro-)physiological aspect of SP, which is reflected in the frequency of SP, is very basic and has little to do with personality traits as measured with the TAS. In contrast, the question of *how* SP is experienced, i.e., *what* is perceived, how the perceptions are experienced on an emotional level, and how they are dealt with, depends more on personality traits (here measured with the TAS) and other ExEs (here measured with the PAGE).

The correlations between the SP hallucination factors and the BitSS global scale were not significant. We found weak but partly significant positive correlations with the subscales “Common Paranormal Beliefs” and “Supernatural Entities.” Individuals with SP who have stronger belief in ghosts, demons, angels, divine beings, the devil, the efficacy of astrology, card readings, psychics who can predict the future, haunted buildings, etc. reported more SP hallucination factors phenomena. The link between beliefs and experiences poses a difficult problem. Are beliefs the result of experience, or do pre-existing beliefs foster corresponding experiences, or are beliefs and experiences independent? The problem of the relation between experience and beliefs is well known and the scientific debate about it has been stimulated by the phenomenon of SP. Hufford’s *experiential source hypothesis* was groundbreaking in this regard (Hufford, 1982). For instance, Cassaniti and Luhrmann (2014) examined the reciprocal influences of physiologically-based experience and culturally mediated narratives and interpretations in a cross-cultural comparative study of spiritual experiences that included questions about SP. Subsequently, many reductionist models have been developed to understand the origin of supernatural beliefs, which see the sole cause in evolutionary experiential and brain-based structures (e.g., Craffert et al., 2019). Jalal presented an experientially-based Panic-Hallucination Model of SP. According to his model, “somatic symptoms, coupled with the awareness that one is paralyzed, can activate a host of psychological symptoms; including fear and worry that are worsened by catastrophic cognitions about the attack (e.g., ‘I am dying’). This in turn may generate an amygdaloid fight-flight reaction and panic-like arousal” (Jalal, 2016, p. 2). The accompanying hallucinations are interpreted according to the socio-cultural framework of the experiencer. The weak correlations between hallucination factors and the subscales “Common Paranormal Beliefs” and “Supernatural Entities” of the BitSS can only be interpreted as a weak indication of a possible causal relation, although the direction cannot be inferred. A large part was gained through a website reporting news from different areas of

anomalistics. The readership is very heterogeneous due to the breadth of the range of topics and the rather neutral reporting and even skeptics can get information there. One might assume, as one of the reviewers did, that the sample would have elevated scores in the paranormal belief scales compared to the general population because they are interested in the content of such a website. This seems to be not the case. The average values of our sample are in the same range as those of the two samples from a university setting used for the validation of the BitSS (Schofield, E-Mail from February 1, 2022). However, this problem plays a minor role in the investigation of the connection between the frequency of SP and supernatural beliefs. More frequent SP should reinforce or solidify supernatural beliefs according to the experiential source hypothesis. The absence of significant correlations between supernatural beliefs and frequency of SP in our study tend not to support the assumption that SP is a major source of human belief in ghosts – at least this is true for our sample coming from a secular Western society.

At the level of single items, out-of-body experiences stood out, with significant positive correlations to all subscales except “Religious Beliefs.” There were no significant correlations of single items with “Religious beliefs” at all except “Visual Hallucinations,” which had a weak negative correlation to this subscale. This is partly consistent with results by Tobacyk and Mitchell (1987) who compared OBE experiencers and non-experiencers with respect to various personality traits including paranormal beliefs. They used the *Paranormal Belief Scale* (PBS; J. Tobacyk & Milford, 1983) and found significant differences between OBE reporters and nonreporters in the overall PBS score and in several subscores, with the former scoring higher. The “Traditional Religious Beliefs” subscale, which is comparable to the “Religious Beliefs” subscale of the BitSS, showed no difference between groups, consistent with our results. In summary, the link between SP and paranormal or supernatural beliefs remains unclear.

The connection between supernatural beliefs and experiences interpreted as paranormal during SP is plausible. A more pronounced belief in the supernatural makes it easier to interpret strange experiences as paranormal. The positive correlations between PAGE scores and paranormal experiences during SP are also understandable because PAGE asks about experiences that tend to be interpreted as paranormal. Therefore, the strong correlation with paranormal beliefs is not surprising.⁴ The connection found between TAS and paranormal experiences is somewhat less self-evident. Why should higher absorption, i.e., an openness to delve into mental

imagery and fantasy, tend to lead to paranormal interpretations of strange experiences? Is it because this openness allows for a worldview that is not confined within the boundaries of a physicalist worldview that dominates Western academic science? The results regarding gender differences might provide some interesting clues. Females had higher TAS scores than males. Looking at the association between TAS and paranormal experiences during SP separated by gender, we found a highly significant association only among males. The correlations between paranormal experiences during SP and supernatural beliefs and ExEs (PAGE) were also notably higher in males than females. Furthermore, absorption was significantly correlated with the Intruder factor only in males. Taken this all together suggests that the males differed more regarding paranormal experiences than the females which are generally more open to paranormal experiences and supernatural beliefs – the latter mainly regarding the subscale “Common Paranormal Perceptions.”

This brings us to the limitations of this study. Because of our special interests, we did not use a control group of participants without SP. We also obtained our selected sample via participation calls on topic-specific websites. Thus, our sample is far from being representative of the general population. For instance, the gender effects we found could partly be due to the composition of the group of males in our sample. About 62% of the participants in the GW sample (N = 325) were male, whereas this was the case for only about 22% of the FB sample (N = 55). The website “Grenzwissenschaft aktuell” is aimed at people who have a special interest in the border areas of psychology and parasciences. Although the contributions on the website are of a popular-scientific nature and do not only appeal to scientifically educated persons, the author tries to convey as neutral and differentiated a point of view as possible. Therefore, among the readership one can assume both rather skeptically minded people and believers, who are, however, all interested in extraordinary phenomena and do not represent an average population. The FB sample could be much more homogeneous because the FB groups involved have a much narrower range of interests that are closely related to the SP phenomenon. Therefore, generalizability of the results to the normal population is limited. We gathered self-reported, subjective data, which must be taken into consideration when interpreting the findings.

There are also limitations at the level of statistics. Large parts of the study were exploratory, so many tests were conducted. This increases the probability of an alpha error, whose estimation is difficult because

many variables are not independent, such as the subscales of the PAGE from the global scale. The same applies to feelings, emotions, and some perceptions that occur during a SP. Therefore, a Bonferroni correction would have led to overly conservative estimates. For further formation of hypotheses, readers may consider only correlations significant at the .01 level. As for our hypotheses, we are on the safe side as the two confirmed hypotheses have an alpha error of less than 1% and the other two were not confirmed.

In general, we would like to make two further points to consider when interpreting the results: (1) When you study ExEs, you are dealing with generally rare to very rare experiences. This does not mean, however, that they are not relevant to the lives of those affected. Quantitative evaluations are possible even for rare events, but one should not overestimate the accuracy of statistical results. Frequency estimates of ExEs in particular, which are supposed to span an entire lifespan, are subject to large uncertainties because, for rare events, memory may become inaccurate or fail with increasing temporal distance. Nevertheless, quantitative analyses can provide valuable clues to understanding the phenomena under study. (2) We decided to use a selected sample without a control group due to the nature of the phenomenon under study and the research questions we chose to examine. This gave us a natural bias with respect to some of the variables studied, some of which are highly correlated with each other, e.g., the scales of the PAGE with the TAS and the BitSS. Due to the greater homogeneity of the sample with respect to ExEs that included SP as a selection criterion, lower correlations were to be expected than if we had worked with a control group without SP. Therefore, we also consider low correlations as relevant if they are highly significant.

Although our hypotheses were only partially confirmed, the exploratory evaluation revealed some interesting correlations with these variables. We found a significant association between the PAGE dimension “Internal,” the V-M factor, absorption, and the two emotions with positive connotations “Feeling of Happiness” and “Sense of Curiosity.” This, along with some other evidence from our data, leads us to propose that there could be two types of SP: one mainly connected with typical negative emotions and an external focus, which falls into the quadrant of the PAGE model built by the poles “external phenomena” and “dissociation phenomena”; another one, which can be accompanied also by positive emotions and is associated with more internally experienced perceptions of the vestibular-motor kind, and which falls into the quadrant of the PAGE model

formed by the poles “internal phenomena” and “dissociation phenomena.” However, a clear assignment to the quadrants of the PAGE model is only possible at a theoretical level, since SP represents only one of a multitude of phenomena measured by the PAGE and the SP experiencers have usually experienced other EXEs as well. To further explore the question of an external or internal focus of the experience of SP more research with targeted questions is needed.

SP is a fascinating phenomenon associated in many ways with other extraordinary experiences, altered states of consciousness, and the field of anomalistics. In any case, a mere reduction to a neurophysiological phenomenon based on a desynchronization of physiological REM sleep state and waking consciousness does not do justice to the variety of different ways of experiencing SP. Hallucination-like experiences during SP cannot be understood simply as dream images intruding waking consciousness because REM dream content is usually different from the shapes and forms perceived during SP (Mayer & Fuhrmann, 2021). The thesis that the hallucinatory experiences during SP form the basis of human belief in ghosts and demons is too simplistic. Even though the neurophysiological core of SP is now quite well researched and some plausible explanatory models of etiology are available, many questions regarding the experience, interpretation, coping, and cultural embeddedness remain open. The results of our study contribute to a more nuanced picture of SP.

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The Role of Masked Solutions in the Accuracy of an Insight Problem-Solving Task¹

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Abstract: The primary aim of the study was to test the alleged facilitating role of insight-like strategy in the detection of masked solutions Compound Remote Associates problems (CRA). A sample of 114 participants solved 19 CRA problems presented online. Participants were requested to solve the problems in which either the solution to the CRA was randomly presented in a masked condition or no solution was provided. After each trial participants were requested to report whether they had used insight or analytical strategy, and were also required to complete a sensation seeking scale and a measure of creativity. The results showed a small, but robust correlation between the CRA problems accuracy and the degree of insight-type strategy used for their solution. The degree of sensation seeking, the score in creativity, and the outcome of the manipulation check did not reveal any influence on the CRA problems solution. The use of intuitive strategies may facilitate psi-related creative problem solving, but confirmatory research is needed.

Keywords: Compound Remote Associate problems; insight; intuition; masked stimuli; anomalous cognition; psi; creativity

Highlights

- Completely masked solutions improve the accuracy of creative problem-solving tasks
- This information can be detected at an unconscious level, but only by adopting insight/intuitive-like strategies
- The use of intuitive strategies may facilitate creative problem solving

The influence of subliminal information on perceptual and cognitive processes, including problem-solving, represents a strongly debated topic in the field of psychology that has received considerable empirical at-

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tention (Erdelyi, 2004; Goldstein et al., 2020; Kihlstrom, 2004; Merikle, 2000). A frequently used method for studying subliminal processing is the masked priming paradigm in which some stimuli are presented for very short time and masked in order to prevent their overt conscious identification, but can be detected by our visual system (Van den Bussche et al., 2009).

Conversely, little is known about the influence of completely masked (without priming) information (Carpenter et al. 2021; Wilson, 2002), that is, information that cannot be detected even unconsciously by our sensory organs. The reason for this different consideration is obvious: how could a completely masked information affect the solution of a problem given that no sensory information can be transmitted even unconsciously to the agent?

The only plausible hypothesis is that information conveyed by masked information can be detected only if our mind (cognitive system) can detect it by using a sort of anomalous cognition or psi. Whereas this possibility is excluded if we assume that our mind is merely a byproduct of our neurophysiological system, as assumed by different models of mind-brain relationship such as identity theory (Smart, 2017), it can be possible if we adopt a model where mind is not constrained by the neurophysiological limits of the sensory organs, e.g., idealism (Kastrup, 2018), Advanta-Vedanta (Sedlmeier & Srinivas, 2016), and dual-aspect monism (Walach, 2020).

In this exploratory study, we aimed to investigate if adopting fast-thinking insight-intuitive like strategies, that is decisions not based on reasoning, very similar to the System 1 strategies described in the dual-aspect model of reasoning (De Neys & Pennycook, 2019; Stanovich & West, 2000) would make possible to unconsciously detect information useful for the solution of a problem-solving task.

Among the paradigms used in the study of problem solving, the validated Italian version of the compound remote associate problems (CRA problems; Salvi et al., 2015), has been employed. The CRA problems are commonly used for assessing insight problem solving. Importantly, they belong to a new generation of problems that relative to the classic ones are easier, so that many of them may be correctly solved in the same session, generating more data, they do not require domain-specific knowledge to be solved, and they use a more rule-consistent task. In addition, in line with a recent and more bottom-up approach, problem solvers were asked

to focus on their subjective experience and to self-report how they solved each problem - relatively more by analysis or by insight. In doing so, participants' self-reports about solving were used as the discriminative criteria to categorize the solving processes.

In general, solving problems by sudden insight is considered a significant form of creative cognition. Recently, a positive correlation between creativity and performance in problem solving-tasks (i.e., CRA problems), was reported (Olson et al., 2021). As a consequence, in the present study we aimed to test the possibility that those participants who engaged in insight-like process to solve CRA problems more frequently would show a better performance in a creativity task, namely the Divergent Association Task (DAT, Olson et al., 2021).

Finally, we were interested in assessing individual difference that could correlate to such perception. Over the years, a small but reliable correlation has emerged between extraversion and performance on similar tasks (Honorton et al., 1992). Specifically, the component of extraversion that underlines this correlation appears to be the susceptibility to boredom and a tendency to seek out stimulation. To assess stimulus seeking as a possible moderator on the CRA problems solution, we used the two-statements scale developed by Bem (2011).

We aimed to test if making available the solution of the CRA problems in a masked form could improve their solution simply warning the participant of its presence, but without any possibility to see it neither before nor after the problem solution. An enhanced performance was also expected when an insight-like strategy was used to solve the masked form of CRA problems. This experimental paradigm has been rarely used. Usually, participants are requested to guess or describe the target before its overt presentation and not to use it to solve problems without any possibility to overtly see it as in our case. However, the possibility that the mere presence of an information can be used by humans even if at an unconscious level if necessary for them, is predicted by James Carpenter's (2015) "First Sight" model. In his words (Carpenter, 2004):

This model assumes that each organism, by its nature, extends beyond itself into the larger pre-sensory surround. Psi [extra-sensory-perception] is assumed to be neither knowledge nor action, but to belong to

the outermost temporal edge of those normal pre-experiential mental processes by which the mind structures all its experiences and commences all its actions. Psi processes are posited to function normally as the unconscious leading edge of the development of all consciousness and all intention. This unconscious functioning is normal and continuous, and is a constituent element of all experience. (p. 1).

Our main hypothesis was that the masked solution of CRA problems would influence their solution, but only when participants adopted an insight-type approach. Our secondary hypothesis was that sensation seeking level and creativity can act as moderators on the CRA problems solution. We expected that especially those participants who showed a tendency to seek stimuli and higher DAT scores would also use insight-like process in the solution of CRA problems.

Method

Participants

One-hundred-thirty-one Italian participants were recruited through social media, 50 of them through the Prolific platform. In the latter, they received € 6.00 for their participation; 17 participants had to be discarded from further analyses because they did not complete the test or declared to have seen the solution of the CRA problems at least once. The final sample was composed of 114 participants: males = 55; females = 59, $M_{age} = 31.2$, $SD (11.4)$, range 16-75.

Materials

The Sensation Seeking Scale. Participants were requested to respond to two items related to the Sensation Seeking Scale (Zuckerman, 1974): "I am easily bored" and "I often enjoy seeing movies I've seen before" (reverse scored), that have been found to moderate psi tasks (Bem, 2011). In the present study, responses were recorded on a Likert 5-point scales, from 1 (Very Untrue) to 5 (Very True). In our sample, the two scores were summed into a single score ranging from 2 to 10 ($M = 5.7$, $SD = 1.68$). Higher scores indicate higher levels of stimulus seeking.

The Divergent Association Task. Participants were required to complete a measure of creativity, the Divergent Association Task (DAT; Olson et al., 2021). They were asked to name 10 words that are as different from each other as possible in all meanings and uses of the words. The words *pen* and *pencil*, for example, would be close to each other and thus semantically similar, since they are often used in similar context. The words *astronaut* and *apple* would not be close to each other and thus less semantically similar. According to the original study, the greater the semantic distance between the words, the higher participants score on other creativity and insight problem-solving tasks (e.g., CRA). The original English version of the task computes the semantic distances using a model based on a corpus called Common Crawl, which contains the text of billions of web pages. Given that this model is not readily available in Italian, a different one was used to compute the average semantic distance between words. Specifically, a pre-trained model was used based on a corpus of text from Italian web sites (Cimino et al., 2018). DAT scores ranged from 0 to 200, with higher scores indicating a greater semantic difference between the words.

Compound Remote Associates problems. Twenty CRA problems were selected from the Italian version list validated by Salvi et al. (2016). Given the exploratory nature of the present study, we decided to favor gathering a higher amount of information about the preferred strategies of the participant over the manipulation of the level of difficulty. Thus, we decided to select them among the first quartile of difficulty, resulting in the least difficult problems. A similar recommendation is also reported on the original study (Salvi et al., 2016). All problems and instructions were presented online using the Qualtrics platform.

Procedure

Participants were tested online through social media and Prolific platforms. Qualtrics software was used to implement the experimental procedure. They were told that the study aimed to investigate their ability to engage intuition. They were first presented with a two-items measure, assessing their tendency to seek stimulus. Subsequently, participants completed the DAT. Given that no validated Italian version of the DAT is available, the instructions and the items used in the present research were translated into Italian by the first author and back translated by an independent translator before arriving at a final version that all authors agreed best capture the original meaning (contact the first author to get the version in Italian). After a 3-minutes relaxation period, par-

ticipants were presented with the CRA problems, in which three cue words were presented and they were required to try to find a fourth word that created a compound word with the cues. In half of the conditions in random order the solution to the CRA problems were presented masked, in the other half no solution was presented. The instructions were:

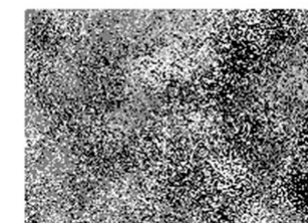
“Now you will be presented with some problems. For each problem you will be shown three words. Your task is to find a fourth that can be combined with each of the three presented, forming a compound word or sentence. You have 15 seconds to find the solution. In case you do not find the solution in time, you will move on to the next problem. The solution will be presented to you even if disguised. We ask you to ignore this information and use your pure intuition (i.e., instinctively, without reasoning) to find the solution. After you have provided your answer, you will be asked to indicate if you have found the solution using an INSIGHT or ANALYTICAL strategy. INSIGHT means that the answer came to your mind suddenly (i.e., unexpectedly) while you were trying to find the solution, without being able to explain how you found it. ANALYTICALLY means that you have identified the answer after deliberately and consciously trying several words until you have found the correct one. In this case, for example, you would be able to indicate the steps that led you to the solution.”

After two examples and a relaxation time of three minutes, the 20 problems were randomly presented for a maximum of 15 seconds. Each problem was presented as in Figure 1. The study was approved by Ethical Committee Prot: 2476 of the Dipartimento di Psicologia, Università degli studi di Padova, Italy.

Figure 1

Example of the English Version of CRA Problems. In the Masked Condition, the Solution Was Presented Under the Gray Square (“Cheese” in this Case)

SWISS GOAT HOLES



Manipulation Check. At the end of the CRA problems, participants were requested to respond to the following question: “In your own words, what is the purpose of the study you have just participated in?” Most participants (71.1%) named at least the words “insight” and/or “reasoning” in their responses.

Results

Due to technical reasons, a problem was not presented, consequently all statistics refer to the solution of the remaining 19 problems. All analyses were performed using the freeware software Jamovi (2021) v.1.8.1. Table 1 shows descriptive statistics related to percentages of correct solutions when the solutions were presented masked (%CRA problems_T) or not presented (%CRA problems_F). The percentage of CRA problems accuracy when their solutions were presented masked and when they were not presented are almost identical. Their correlation is .58; 95% CI: .44 - .69, $t(113)=-.33$; $p=.74$.

Table 1

Percentages of Correct Solution to CRA Problems

	% CRA problems_T	% CRA problems_F
Mean	.69	.69
SD	.20	.21

Note: CRA problems_T = masked response true; CRA problems_F = masked response false.

Moderators Effects

In order to examine whether sensation seeking, creativity, and insight predicted masked problem solving, we carried out a multiple linear regression with the difference score in masked problem solving ($\text{DiffCRA} = \% \text{CRA problems}_T - \% \text{CRA problems}_F$) as the outcome and SSTot, DAT score, and the number of CRA problems solved using an insight-type strategy as predictors (this way to analyze the data was suggested by a reviewer). The corresponding violin plots are presented in Figures 2 and 3 and the results of the multiple linear regression are presented in Table 2 (the violin plot with all data of the difference between the percentage of correct CRA problems solution (DiffCRA problems) when the solution was presented minus when it was not presented. Black square corresponds to the mean).

Figure 2

Difference Between CRA Problems when Solutions were Presented or Not

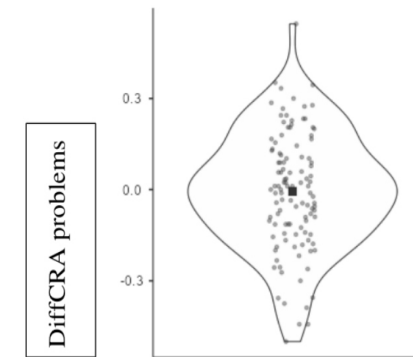
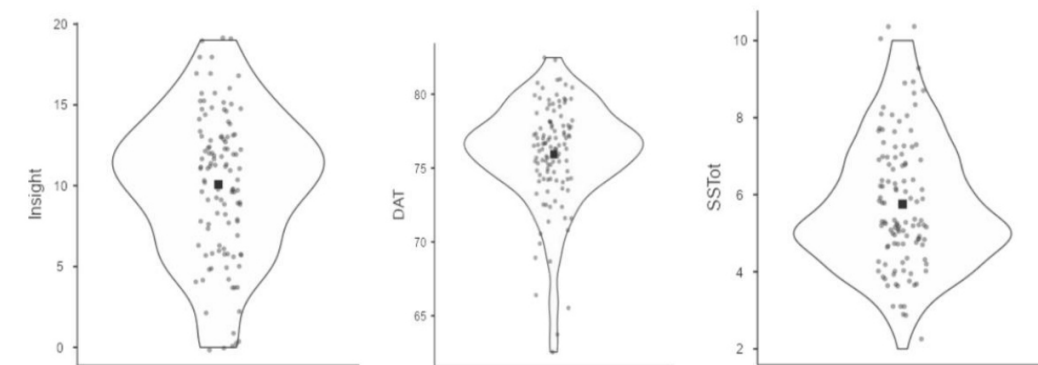


Figure 3

Violin Plots of Moderator Variables



The results clearly show that only insight, that is the number of CRA problems solved with an insight-type strategy influenced the CRA problems accuracy even if the effect size is small. This interpretation is supported by the result of a simple linear regression analysis using only insight as covariate, see Table 3 and Figure 4. As a side note, almost identical results are obtained standardizing all variables as z scores.

Table 2*Multiple Linear Regression of the Moderators on the DiffCRA Problems*

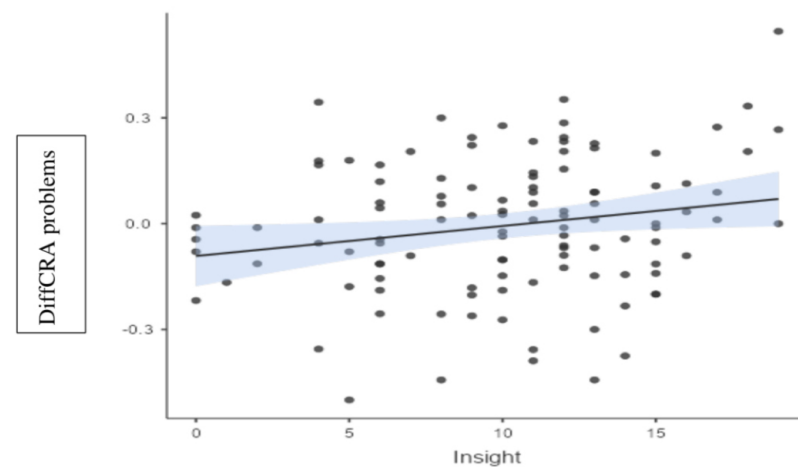
Predictor	Estimate	SE	t	p	Stand. Estimate	95% Confidence Interval	
						Lower	Upper
Intercept	-0.507	0.400	-1.26	0.208			
Insight	0.008	0.004	2.04	0.043	0.194	0.006	0.383
SSTot	-0.006	0.011	-0.54	0.589	-0.051	-0.237	0.135
DAT	0.006	0.005	1.173	0.243	0.111	-0.077	0.299

Note: The overall model fit is $R = .22$; $p = .14$; $N = 114$. The model satisfied the assumption of independence of the residuals, Durbin-Watson Test = $-.12$; $p = .23$ and absence of multicollinearity, variance inflation factors ranged from 1.005 to 1.022.

Table 3*Linear Regression*

Predictor	Estimate	SE	t	p	SE	95% Confidence Interval	
						Lower	Upper
Intercept	-0.092	0.043	-2.12	0.036			
Insight	0.009	0.004	2.18	0.031	0.202	0.018	0.385

Note: The overall model fit is $R = .20$; $p = .027$.

Figure 4*Scatterplot of the correlation between Insight score and DiffCRA problems*

A further hint about the specificity of the relation between the Insight score and the CRA problems when solutions were presented masked (%CRA problems_T) derives from their correlation: $.179$; $p = .057$ whereas when the solutions were not presented (%CRA problems_F), the correlation is: $-.01$; $p = .91$.

Manipulation Check. Participants were divided in two categories according to the detection or not of the aim of the task and there were no statistical differences for the DiffCRA problems, $t(112) = .86$; $p = .39$ (for task detection, No - 33, DiffCra problems = 018 (.23), Yes - 81, DiffCra problems = 016 (.17)).

Discussion

This study was designed to examine whether completely masked stimulus presentation could influence creative problem solving and whether this effect was related to individual differences in creative ability, the use of insight strategy, and sensation seeking personality. There was no main effect of the masked stimulus paradigm, suggesting that creative problem solving was not generally facilitated by completely masked stimuli. However, unlike creative ability or sensation seeking, the use of insight strategies did predict better performance in the masked stimulus condition. This suggests that masked stimulus presentation may indeed facilitate creative problem solving in those using insight rather than analytic strategies. The specificity of this influence is supported by the lack of influence of the two other moderators, sensation seeking level and the DAT score. The small effect size of the masked solution influence was expected considering that participants were in a normal state of consciousness and requested to solve a complex cognitive task and not to identify or guess the masked target as it is usually being used in this field (Tressoldi & Storm, 2021).

Despite unconscious perception remaining one of the most intriguing and strongly debated topic of research, the vast majority of the studies have investigated the topic using a masked priming paradigm, where the visibility of a prime stimulus is only reduced by a visual masking (Van de Bussche et al., 2009). Adding to the existing literature, we explored the possibility that the adoption of an insight-like strategy can positively influence the solution of a problem-solving task; especially when the solution is completely masked and so the information can only be detected unconsciously.

The main limitation of the study is its completely exploratory nature. Consequently, our results must be considered provisional and interpreted with caution. Only replication studies with a confirmatory approach, for example using a registered report protocol, could support our findings. Our results, even if carried out with an exploratory approach, support Carpenter’s first sight model positing that “pre-sensory” (alias extra-sensory, nonlocal) information can be detected at an unconscious level, influencing our behavior and cognitive tasks, but only adopting insight/intuitive like strategies, bypassing those ones based on reasoning that is, those deriving from conscious cognitive processing of information.

In addition, they also inform and expand our understanding of insight problem solving procedure and underlying processes in the Italian language and culture that only recently has been taken into consideration by researchers (Salvi and colleagues, 2016). Also, the present study represents the first attempt to adapt a new measure of creativity (i.e., DAT) to the Italian context.

Data Availability Statement

The dataset from this study can be found at: <https://doi.org/10.6084/m9.figshare.13487571>

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Appendix

Instructions and items translated from the Italian version of the Divergent Association Test.

Instructions and items of the Divergent Association Test.

Instructions

Please write 10 words that are as different from each other as possible, in all meanings and uses of the words.

Rules

1. Only single words.
2. Only nouns (e.g., things, objects, concepts).
3. No proper nouns (e.g., no specific people or places).
4. No specialized vocabulary (e.g., no technical terms).
5. Think of the words on your own (e.g., do not just look at objects in your surroundings).
6. You will have 4 minutes to complete this task.

Words...



Childhood Imaginary Companions and Schizotypy in Adolescents and Adults¹

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Abstract: *Objective:* This study evaluated the association of Childhood Imaginary Companion (CIC) status and schizotypy levels of adolescents and adults within the framework of the Hierarchical Taxonomy of Psychopathology (HiTOP). *Method:* The sample included 255 Iranian adolescents and adults, grouped according to their CIC status, who responded mostly via e-questionnaires on a website. Schizotypy dimensions were compared between these two groups. Two measures compatible with the HiTOP model were also evaluated both in relation to the short scale of the Oxford-Liverpool Inventory of Feelings and Experiences (sO-LIFE) schizotypy dimensions and the CIC status of participants; one scale used exclusively with adolescents (i.e., the Achenbach System of Empirically-Based Assessment-Youth Self-Report [ASEBA-YSR]), and another with adults (i.e., the NEO-Five Factor Inventory [NEO-FFI]). *Results:* Scores on the unusual experiences (UnEx) the impulsive nonconformity (ImpNon) dimensions, and the total score of the sO-LIFE were higher for the CIC group. For adolescents, the UnEx dimension and the Thought Problems subscale of the ASEBA-YSR correlated. Scores on three subscales of the ASEBA-YSR (i.e., Thought Problems, Obsessive-Compulsive Problems, and PTSD Problems) were significantly higher for the CIC group. For adults, the neuroticism domain of the NEO-FFI correlated strongly with total score of the sO-LIFE and the cognitive disorganization (CogDis) dimension. This domain of the NEO-FFI was the only one in which CIC adults scored higher than the NIC group. *Conclusion:* CIC in adolescents and adults is associated with a set of schizotypy dimensions in line with the concept of the “happy schizotype.”

Keywords: positive schizotypy, imaginary friend, psychosis spectrum

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Highlights

- Having imaginary companions (IC) relates to higher schizotypy scores
- Having IC matches with the adaptive aspect of schizotypy
- Schizotypy and IC status relate to higher classifications of mental phenomena

The childhood imaginary companion (CIC) is a fantasy character created by some children throughout development. As the term suggests, ICs are vivid pretend characters (e.g., people, animals, fictional creatures) that the children having them act as if they were real and interact with them (e.g., talk to them, refer to them by name) in their daily activities and play (Taylor, 1999). Svendsen (1934) defined an imaginary friend as: “an invisible character named and referred to in conversation with other persons or played with directly for a period of time, at least several months, having an air of reality for the child, but no apparent objective basis” (p. 988). Reports of ICs are as diverse and distinctive as children’s personalities. As an example, Taylor (1999) described the ICs of a 4-year-old girl as “two invisible birds named Nutsy and Nutsy... lived in a tree outside her bedroom window... had brightly colored feathers... they [parents] regularly observed their daughter talking and playing with them” (p. 8). Svendsen’s definition of ICs has been employed in most of the scientific literature ever since. However, this definition fails to take into consideration another very similar phenomenon: personified objects (POs). They are stuffed animals and dolls that children treat as if they were real and had a personality of their own (Davis, 2020). For POs to count as ICs, they must align with Svendsen’s definition, which excludes transitional objects. A related fantasy play to ICs is impersonation (imaginary identities). Impersonation happens when children create imaginary characters and impersonate them on a regular basis (Taylor, 1999; Taylor et al., 2013). In addition to the phenomenological overlaps of the experiences, these two phenomena are similar to invisible ICs in regard to the higher level of theory of mind (ToM) of the children having them (Taylor & Carlson, 1997). Nevertheless, some studies show differences between invisible ICs and POs regarding the relationship children have with them (Gleason, 2002): relationship with the former being more like with peers (i.e., “horizontal”), while children interact with the latter in a more nurturing and care-giving style (i.e., “vertical”). This might be the reason why children with invisible ICs were found to receive more positive peer nominations than children having POs (Lin et al., 2018).



Scientific investigation of ICs has been through a turbulent history. Earlier studies associated them with an array of deficits in personality and problems (Vostrovsky, 1895). For instance, Svendsen (1934) described children having ICs as timid in the presence of other children, but more recent studies did not find such differences between children with and without ICs (Mauro, 1991), and even reported the adaptive role of ICs in the lives of children (Bender & Vogel, 1941). One explanation for these opposing findings is the recruitment of samples from outpatient clinics and without control groups in earlier studies (Taylor, 1999). Indeed, prevalence rates of children having ICs, 13 to 65 %, emphasize the normality of this phenomenon (Davis et al., 2019; Pearson, 1998; Svendsen, 1934; Taylor et al., 2004). Moreover, research into personality characteristics and behavioral correlates of IC play demonstrated a range of positive attributes. This type of imaginative play was reported to provide children with a more advanced theory of mind (Giménez-Dasí et al., 2014; Taylor & Carlson, 1997) and greater positive adjustment among high-risk pre-adolescents (Taylor et al., 2010).

Additionally, studies have found relations between having ICs and scoring higher on creativity scales (Hoff, 2005). Schaefer (1969) reported that adolescents with a history of IC play were more likely to belong to the creative group of their study compared with peers without it. This finding was shown among adults as well (Kidd et al., 2010). Another relevant line of research associated IC play with fantasy-oriented activities. In a longitudinal study, one-year-old toddlers showing tendency toward fantasy-based toys were more likely to engage in IC play at the age of four than those preferring reality-based toys (Acredolo et al., 1995). Furthermore, adult fiction writers tend to report more memories of childhood ICs than population norms (Taylor et al., 2003). Inclination toward fantasy and more advanced imaginative abilities among those with IC play experience was further explored in other studies (Firth et al., 2015). Trionfi and Reese (2009) found that children with ICs are better able to tell detailed narratives about a story and a personal experience than their peers. In a study of 102 female students, Gleason et al. (2003) found associations between having ICs and more imagery use, as well as more vivid night dreams and violent daydreams. Similarly, children with ICs were reported by parents to be highly imaginative, use myth in their games, and refer to events as magical (Bouldin & Pratt, 1999). Relevantly, readiness for daydreaming was found to be the most reliable predictor for using a diary in the role of an imaginary friend among adolescent diarists (Seiffge-Krenke, 1997). Collectively, these studies found links between having ICs and showing higher fantasy-proneness among different age groups.

Considering this proposed link, there have been studies on personality correlates of fantasy-proneness. In a recent meta-analysis of 132 articles comprising 24,007 participants, Merckelbach et al. (2021) demonstrated large effect sizes ($r_s > .50$) for hallucination-like experiences, magical ideation, aberrant perceptions, dissociation, and daydreaming, as correlates of fantasy-proneness. Earlier studies showed better hallucinatory ability of fantasizers compared to those low and medium in fantasy-proneness (Lynn & Rhue, 1988).

Childhood IC status has been proposed to be related to the propensity to hallucinate (Pearson et al., 2001). This was shown using ambiguous auditory stimuli tasks (e.g., the Jumbled Speech task) in which IC children reported hearing more meaningful words than a control group (Fernyhough et al., 2007). Davis and colleagues (2019) demonstrated that adult reports of childhood IC predicted prodromal symptoms of hallucination with childhood adversity partially mediating this relation. Furthermore, using both an auditory signal detection task (needing participants to detect speech in embedded noise) and the Launay-Slade Hallucination Scale-revised (LSHS-revised; Bentall & Slade, 1985), Fernyhough and colleagues (2019) found a bias towards detecting speech in white noise as well as higher auditory verbal hallucination (AVH) scores in adults with a history of childhood ICs. It is necessary to mention that hallucinating per se is not an indicator of pathology (Bentall, 2014), around 10% of the general population experience hallucinations without necessarily being diagnosed with any mental disorder (Bentall & Slade, 1985; Posey & Losch, 1983; Van Os et al., 2000).

Relatedly, schizotypy is a multidimensional personality construct that, according to Claridge (1997), results from a combination of genetic, environmental and personality factors and has a normal distribution in the general population. It represents the underlying predisposition in a quasi/fully dimensional view of schizophrenia that expresses itself across a broad range of personality, subclinical, and clinical phenomenology (Kwapil & Chun, 2015). The quasi-dimensional perspective of schizotypy originates in the clinical tradition that identified mild symptoms of schizophrenia in the relatives of patients (Bleuler, 1950; Kraepelin, 1919). Later, Meehl (1962) described schizotypy as a personality organization that is taxonic in nature and shows liability for schizophrenia (Lenzenweger, 1998). It was shown (Morrison et al., 2002) that individuals at high risk for later developing psychosis also scored higher in a schizotypy inventory (Oxford-Liverpool Inventory of Feelings and Experiences [O-LIFE], Mason et al., 1995). There is also longitudinal evidence that those with an increased genetic risk of psychosis report higher levels of schizotypy than controls (Miller et al., 2002). However, a po-



tential risk of psychosis does not mean actual conversion to full-blown disorder in the majority of the cases reporting higher levels of schizotypy, and it may have adaptive manifestations as well (Claridge, 1997; Claridge & Beech, 1995). Claridge's model posited the dimensionality of schizotypy not only in the clinical and subclinical ranges (as in the quasi-dimensional view), but also as part of normal individual differences including healthy expressions such as creativity (Kwapil & Barrantes-Vidal, 2015). Longitudinal studies have reported that the majority of those scoring high in self-reported schizotypy scales never end up having a psychiatric disorder (Chapman et al., 1994; Gooding et al., 2005).

Ascribing both adaptive and pathological sides to schizotypy is relevant to the heterogeneous nature of this construct, which manifests itself in its multidimensionality (Mohr & Claridge, 2015). The three-factor construct of schizotypy, as the most widely accepted view, comprises positive, negative, and disorganization dimensions, and has been established in factor analysis studies (Bentall et al., 1989; Raine, 1991). In addition to these three factors, Claridge and colleagues (Mason et al., 1995; Mason et al., 2005) suggested a fourth dimension -impulsive nonconformity- based on overlapping conditions between psychosis and bipolar disorder, proposing these two to lie on a continuum.

The positive dimension of schizotypy includes traits like unusual experiences (aberrant perceptions and hallucination-like experiences), eccentric ideas (magical and not based in consensual reality), and fantasy proneness (vivid imagination and immersion in inner experiences) (Claridge & Beech, 1995; Fonseca-Pedrero et al., 2021; Kotov et al., 2020). The previously mentioned links between schizotypy and creativity are mostly due to the positive dimension (and to impulsive nonconformity) (Batey & Furnham, 2008; Mohr et al., 2001); especially because positive schizotypy enhances convergent (Gianotti et al., 2001) and, more importantly, divergent (Jones et al., 2011) styles of thinking. This dimension is also linked to different enriching experiences (Mohr & Claridge, 2015). For example, in an experimental setting enhancing an altered state of consciousness (using shamanic-like techniques), high scorers on positive schizotypy experienced significant altered phenomenology, compared to low scorers (Rock et al., 2008). This experience along with other fairly uncommon experiences, believed to deviate from usual experience or from the consensually accepted view of reality, are collectively called anomalous experiences (AE) (Cardena et al., 2014).

Importantly, the association between subjective evaluation of AEs and schizotypy was shown to be moderated by the cognitive disorganization dimension (Schofield & Claridge, 2007) because cognitively disorganized participants showed a negative schizotypy/distressing experiences pattern, in contrast to organized ones who manifested a positive schizotypy/pleasant experiences relation. This finding emphasizes the adaptive value of positive schizotypy, specifically in the absence of negative and disorganized dimensions (Goulding, 2004; Holt et al., 2008; Mohr & Claridge, 2015; Tabak & Weisman de Mamani, 2013).

The negative or deficit dimension of schizotypy -introverted anhedonia- is the interpersonal aspect of this construct, mainly characterized by social and physical anhedonia, lack of energy, and introversion (Mason et al., 2005). This dimension is mostly responsible for the diminished quality of life, social functioning, and wellbeing of those scoring high on schizotypy scales (Cohen & Davis, 2009; Horan et al., 2007). The third factor in schizotypy is cognitive disorganization, which describes poor attention and concentration, and lowered decision-making abilities (Mason et al., 1995). It was shown to be associated with weak cognitive control and increased emotionality (Kerns, 2006). Impulsive nonconformity is associated with antisocial behavior and affective episodes (Chapman et al., 1984); it relates to Eysenck's Psychoticism Scale and its moderate scores was shown to be related to the preference for a non-conforming way of life (Mason et al., 1995). Phenomenological aspects of childhood ICs, its association with creativity (Hoff, 2005; Kidd et al., 2010; Schaefer, 1969) and fantasy-proneness, and its direct relation with hallucination-like experiences seem to have overlaps with traits and correlates of positive schizotypy and as such, having ICs can be considered an early phenotype of tendency towards (positive) schizotypy later in adolescence and adulthood.

In our study, two different personality and behavioral scales (i.e., one for adolescents and another for adults), in accordance with Hierarchical Taxonomy of Psychopathology (HiTOP), were administered. These scales were used to explore possible personality traits and pathological tendencies: the Achenbach System of Empirically-Based Assessment-Youth Self-Report (ASEBA-YSR) and the NEO Five-Factor Inventory (NEO-FFI) for adolescents and adults, respectively. They were selected to address what Fonseca-Pedrero et al. (2021) mentioned as a challenge of future studies on schizotypy to integrate this construct's traits into personality and psychopathology classifications. The HiTOP model has emerged as a research-driven endeavor to address limitations of traditional taxonomies of psychopathology (Kotov et al., 2017). This system views mental maladapt-

tive characteristics and phenomena dimensionally (i.e., psychological function ranging from normal to abnormal) and uses dimensional measures to assess its components, syndromes, and spectra. Psychosis, as one of its three main superspectra (along with emotional dysfunction and externalizing superspectra), includes two narrower spectra: thought disorder and detachment. The thought disorder spectrum captures individual differences ranging from ordinary and uncreative thinking to perceptive and cognitive style insubstantially based in reality. It comprises symptoms and traits of positive schizotypy. The detachment spectrum mostly represents affective expressions and sociability individual differences including introversion and negative schizotypy (Kotov et al., 2020).

Among adolescents in this study, Thought Problems and Withdrawn/Depressed subscales were hypothesized to be related to the positive and negative schizotypy scales, respectively, as it was found that these two dimensions of schizotypy map onto the two spectra of the psychosis superspectrum (Cicero et al., 2014; Moorman & Samuel, 2018). The relation of having childhood IC with different behavioral subscales of ASEBA-YSR was also explored by comparison with the NIC group to unpack possible pathological tendencies in this group of adolescents.

The NEO Five-Factor Inventory (NEO-FFI) (Costa & McCrae, 1992) is in harmony with the HiTOP model (Conway et al., 2019) and was administered in the adult sample to explore personality traits associated with schizotypy and childhood IC. Among the five factors of the FFM, positive relation of neuroticism with total schizotypy (Asai et al., 2011; Gurrera et al., 2005), and positive schizotypy (Asai et al., 2011; Shi et al., 2018) have been reported, whereas extraversion was shown to be negatively related to negative schizotypy (Rawlings & Freeman, 1997). Additionally, openness to experience is assumed to be positively associated with positive schizotypy (Edmundson et al., 2011; Ross et al., 2002).

To date, no studies have directly investigated the relation between having childhood ICs and schizotypy inventories among adolescents and adults. This study aimed to evaluate differences between CIC and NIC adolescents and adults. Because reports of positive schizotypy reduce with age after adolescence (Fonseca-Pedrero et al., 2018) and also due to overall decrease in schizotypal traits with increasing age (Fonseca-Pedrero et al.,

2012), both adolescents and adults were included in this study to examine if any different patterns would be observed.

Hypotheses

1) Adolescents and adults with a history of IC play will score higher on the Unusual Experiences dimension and total score of sO-LIFE schizotypy scale than those without.

2) The Thought Problems and Withdrawn/Depressed subscales of the ASEBA-YSR will be positively correlated with scores on Unusual Experiences and Introvertive Anhedonia dimensions of sO-LIFE, respectively, among adolescents.

In addition, exploratory questions related to the relations between the four dimensions of the sO-LIFE schizotypy scale and five factors of the NEO-FFI among adults, IC status and ASEBA-YSR scores among adolescents, and IC status and NEO-FFI among adults.

Method

Participants

The target adolescent population were Iranian adolescents between 15 and 18 years of age, for a sample of 96 adolescents (61 females, 63.5%) aged 15-18 years old ($M = 16.88$, $SD = .98$). Sociodemographic data included age, gender, family order, and existence of current mental disorders. All participants completed this section.

Adult participants of the study ($n = 159$; 95 females, 59.7%) were between 19 and 67 years of age ($M = 25.18$, $SD = 6.83$). Overall, 255 adolescents and adults (156 females, 61.2%) participated in this study ($M = 22.05$, $SD = 6.75$). This study was approved by Iran's University of Social Welfare and Rehabilitation Sciences (USWR) research ethics committee.

Measures

The Imaginary Companion Questionnaire., a Persian researcher-made questionnaire to identify impersonation and the two types of ICs (i.e., invisible and POs), was created by the authors of this research paper (Appendix 1). It includes a description of what IC and its types are, written according to previous studies in the area (Svendsen, 1934; Taylor et al., 2004), as well as describing impersonation (Ames & Learned, 1946; Taylor, 1999). There were also questions querying about the characteristics of ICs (e.g., gender, appearance, personality traits). These questions were used to validate the status of IC.

The Short Scale of Oxford-Liverpool Inventory of Feelings and Experiences, sO-LIFE (Mason et al., 2005) was used to assess schizotypy dimensions, in a Persian translation by the authors of this study. This self-report scale includes 43 yes/no items covering four dimensions of schizotypy: Unusual Experiences (UnEx, 12 items), Cognitive Disorganization (CogDis, 11 items), Introverted Anhedonia (IntAn, 10 items), and Impulsive Nonconformity (ImpNon, 10 items). The UnEx dimension describes perceptual anomalies, magical thinking, and hallucinations and measures ‘positive schizotypy’. The CogDis subscale tap poor attention and concentration in addition to weak decision-making and social anxiety. Lack of enjoyment from sources of pleasure is captured by IntAn dimension which reflects negative schizotypy. The ImpNon scale describes impulsive and anti-social behavior. The alpha for the overall scale was .81, with alphas for the subscales between .53 (for IntAn, with two items deleted for lack of reliability) and .78 for cognitive disorganization.

The Achenbach System of Empirically-Based Assessment-Youth Self-Report, ASEBA-YSR (Achenbach & Rescorla, 2001) is a questionnaire that follows the HiTOP model and appropriate for school-aged children and adolescents (11 to 18 years of age). The syndromes section contains 112 items with three options (0 - 2), querying to what extent each item is true about the respondent. The ASEBA-YSR has nine subscales of behavioral problems and characteristics: Withdrawn/Depressed (8 items), Anxious/Depressed (13 items), Somatic Complaints (10 items), Social Problems (11 items), Thought Problems (12 items), Attention Problems (9 items), Rule-Breaking Behavior (15 items), Aggressive Behavior (17 items) and Other Problems (10 items, does not yield a sum score). Two higher order scales are also produced: Internalizing score (31 items) is estimated by the sum of Withdrawn/Depressed, Anxious/Depressed, and Somatic Complaints subscales;

Externalizing score (32 items) is estimated by the sum of Rule-Breaking and Aggressive Behaviors subscales. The ASEBA-YSR was used only for the adolescent sample of this study.

The NEO-Five Factor Inventory, NEO-FFI (Costa & McCrae, 1992) was administered to assess personality traits of the adult sample. This measure consists of 60 items, each describing a statement rated on a Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). Each domain score of “Big Five” is derived from 12 items: neuroticism (N); extraversion (E); openness to experience (O); agreeableness (A); and conscientiousness (C).

Analysis

Scores of sO-LIFE schizotypy dimensions, ASEBA-YSR subscales, and NEO-FFI domains were compared between the two groups, using independent groups *t*-tests. The moderating role of gender and age category was assessed by ANOVAs. For ANOVAs, the Tukeys were used as post-hoc tests. No correction for multiple comparisons was applied. Pearson correlations were used to determine relations between sO-LIFE schizotypy dimensions and ASEBA-YSR subscales and NEO-FFI domains. Data were analyzed with IBM SPSS STATISTICS, version 26.

Procedure

This study was a survey-based comparison of participants with and without IC play history. Adolescent data were gathered through e-questionnaires uploaded on a Persian website dedicated to this study (www.theimaginal.net), and pen-and-paper questionnaires filled by high-school students. The online survey was advertised on social media outlets as a study on imaginary companions. A video clip was produced and uploaded on social media outlets (e.g., Instagram) to advertise the website dedicated to this study. Volunteers had to agree to an informed consent form prior to starting to fill in e-questionnaires. Answers to all of the questions were required (except for the descriptive ones) and participants could not move onto the next questionnaire before completing the previous one. Data were recorded only after all of the e-questionnaires were completed. Pen-and-paper participants were approached by TZ in person. They were informed about the aim of the study and asked if they wanted to participate in it.

Results

Of the 255 participants, 34.5% reported IC play ($N = 88$) while growing up. Additionally, 23% reported impersonation ($N = 58$). Females ($N = 65$) reported significantly more IC play than males ($\chi^2(255) = 9.11, p < .01$). Adolescents and adults did not differ in CIC reporting ($p > .05$). Table 1 shows the frequency and percentage of participants based on their IC status and types.

Table 1

Frequency and Percentage of IC Status/Types Among all Participants

IC status/type	Gender	Frequency	Percentage
Without IC	Female	91	36
	Male	76	30
	Total	167	65.5
Invisible IC	Female	48	19
	Male	17	7
	Total	65	25.5
Personified Object IC	Female	17	7
	Male	6	2
	Total	23	9
Total	Female	156	61
	Male	99	39
	Total	255	100

The sO-LIFE was completed by all participants (Table 2), with overall mean score of 18.71 and standard deviation of 6.58. Females ($M = 20.03, SD = 6.14$) reported significantly higher scores than males ($M = 16.65, SD = 6.75$) on this scale ($t = 4.12, p < .001$) as they did in the UnEx dimension ($t = 3.7, p < .001$). The same gender difference was seen on the CogDis ($t = 3.24, p < .01$) and ImpNon ($t = 2.64, p < .01$) dimensions, but not on the IntAn dimension ($p > .05$).

The relation between having childhood IC and scoring higher on sO-LIFE dimensions among all participants was investigated by comparing means of schizotypy scores between these two groups. Table 2 contains means and standard deviations for overall schizotypy and its dimensions. Those with a history of childhood IC had higher overall schizotypy ($t = 5.05, p < .001$), as well as UnEx ($t = 4.14, p < .001$), CogDis ($t = 2.73, p < .01$), and ImpNon ($t = 4.81, p < .001$), but not IntAn ($p > .05$).

Table 2

Descriptive Statistics for Demographics and sO-LIFE According to CIC status ($N = 255$)

Variables		CIC <i>n</i>		NIC <i>n</i>		Total
Age		88	20.42 (3.67)	167	22.91 (7.78)	22.05 (6.75)
	Gender	Female	65	25.5%	91	35.7%
Male		23	9%	76	29.8%	38.8%
sO-LIFE	UnEx	88	7.10 (2.48)	167	5.65 (2.75)	6.15 (2.74)
		CogDis	88	6.99 (2.54)	167	5.97 (2.97)
	IntAn	88	2.45 (1.73)	167	2.03 (1.65)	2.18 (1.69)
	ImpNon	88	4.91 (1.98)	167	3.62 (2.07)	4.06 (2.13)
	Overall	88	21.45 (5.76)	167	17.27 (6.55)	18.71 (6.58)

An exploratory ANOVA with post-hoc tests were analysed to determine mean differences of overall sO-LIFE and the UnEx dimension between three groups: the CIC group, the NIC group without impersonation, and the NIC group with impersonation. The post-hoc tests revealed that for overall sO-LIFE and the UnEx dimension, the means of the CIC group did not differ from the NIC group with impersonation ($p > .05$), while means of both groups were significantly higher than the NIC group without impersonation ($p < .001$).

The ASEBA-YSR was completed by the adolescents, with Thought Problems subscale mean score of 6.96 ($SD = 4.57$). and for the Withdrawn/Depressed subscale $M = 5.25$ ($SD = 3.1$). Females scored higher in Thought Problems than males ($t = 3.24, p < .01$), but not in Withdrawn/Depressed ($p > .05$).

The correlation between Thought Problems and the UnEx dimension among all participants was relatively strong ($r = .59, p < .001$), the Withdrawn/Depressed and the IntAn dimension were moderately correlated ($r = .31, p < .01$). These correlations were partly seen in the two groups of adolescents, namely correlation between Thought Problems subscale and the UnEx dimension was $r = .57$ in the CIC group and $r = .52$ in the NIC group ($p < .001$). A weak significant correlation of $r = .28$ was found between the IntAn dimension and Withdrawn/Depressed subscale in the NIC group ($p < .05$), but uncorrelated in the CIC group of adolescents ($p > .05$).

Analyses of mean differences between the two groups of adolescents (i.e., CIC and NIC) in Thought Problems and Withdrawn/Depressed subscales, showed that those with childhood IC scored higher than the other group in Thought Problems and Withdrawn/Depressed. Table 3 contains the means and results of independent *t*-tests analyses.

Table 3

Comparison of Means and Independent Groups of ASEBA-YSR According to CIC Status

	CIC (n=36)		NIC (n=60)		Comparison	
	Mean	SD	Mean	SD	<i>t</i> value	<i>p</i> value
Internalizing	20.47	9.57	13.95	10.40	3.06	.003
Externalizing	16.69	8.20	12.97	6.81	2.40	.018
Anxious/Depressed	9.78	4.98	6.50	5.01	3.11	.002
Withdrawn/Depressed	6.25	2.98	4.65	3.04	2.51	.014
Somatic Complaints	4.44	3.69	2.80	3.60	2.15	.034
Social Problems	5.92	3.17	4.12	2.62	3.01	.003
Thought Problems	9.33	4.41	5.53	4.07	4.29	.001
Attention Problems	8.17	3.46	6.28	3.40	2.76	.007
Rule-Breaking Behavior	6.58	4.30	5.12	3.36	1.86	NS
Aggressive Behavior	10.11	5.24	7.85	4.51	2.24	.028
Obsessive-Compulsive Problems	8.42	3.22	5.72	3.39	3.85	.001
PTSD Problems	11.58	4.12	8.08	4.82	3.63	.001

With the exception of Rule-Breaking Behavior, there were significant differences in all other subscales between CIC and NIC groups. Post-hoc ANOVAs, considering both gender and IC status effects on these subscales, revealed that with the exception of Somatic Complaints subscale, the main effects of IC status were significant on these subscales, but not their interaction ($p > .05$). Correlation coefficients between five domains of NEO-FFI and schizotypy dimensions were estimated for all adult participants and according to their IC status (Table 4).

Table 4

Correlations Between NEO-FFI Domains and sO-LIFE Schizotypy Dimensions in Adults per CIC Status (CIC Group n = 52, NIC Group n = 107)

	Total sO-LIFE			UnEx			CogDis			IntAn			ImpNon	
	CIC	NIC	All	CIC	NIC	All	CIC	NIC	All	CIC	NIC	All	CIC	NIC
Neuro	.57**	.7**	.71**	NS	.32**	.31**	.61**	.67**	.66**	NS	.39**	.35**	.45**	.46**
Extrav	NS	-.5**	-.41**	NS	NS	NS	NS	-.45**	-.40**	-.36**	-.56**	-.51**	NS	-.21*
Op.Exp	NS	.3*	.28**	NS	.23*	.19*	.31*	NS	.16*	NS	NS	NS	NS	.37**
Agreea	NS	-.42**	-.34**	NS	NS	NS	NS	-.2*	-.16*	-.28*	-.49**	-.42**	-.33*	-.39**
Consc	-.35*	-.41**	-.38**	NS	NS	NS	-.55**	-.42**	-.46**	NS	-.24*	-.16*	-.32*	-.3**

$p < .05$, ** $p < .01$

As shown in Table 4, the neuroticism and openness to experience domains of the NEO-FFI showed positive correlations with sO-LIFE dimensions. This is in contrast to negative correlations for the other three domains with schizotypy dimensions. The neuroticism domain of the NEO-FFI was strongly correlated with overall schizotypy and CogDis dimension in all three groups. Extraversion was strongly correlated with IntAn dimension in the NIC group and all adults, and interestingly with overall schizotypy and CogDis dimension only in the NIC group. There were no strong correlations between openness to experience and schizotypy dimensions. Agreeableness showed moderate and negative correlations with overall schizotypy, and IntAn dimension in the NIC group and all adults, and with ImpNon in all three groups. The same negative pattern of correlations was seen for conscientiousness, as it was moderately correlated with overall schizotypy, CogDis, and ImpNon dimensions, and had negative strong correlations with CogDis only in the CIC group.

Neuroticism was the only domain of the NEO-FFI showing significant mean difference ($t = 2.42$, $p < .05$) between the two groups of adults with ($M = 30.63$, $SD = 6.7$) and without IC ($M = 27.14$, $SD = 9.15$). As the assumption of homogeneity of variances was violated, the Mann-Whitney U test was also used and the mean difference was still significant at $p < .05$.

An exploratory ANOVA was conducted to determine the interaction of gender and IC status on overall sO-LIFE, UnEx, CogDis, and ImpNon dimensions among all participants. This is especially important to test whether the difference seen between the two groups of participants in these scales, was or was not moderated by gender. The interaction effect of gender and IC status on overall schizotypy score was significant ($F = 4.8$, $p = .029$). Similarly, main effect of both gender ($F = 4.64$, $p = .032$) and IC status ($F = 24.54$, $p < .001$) were significant. As a reminder, females scored higher than males on overall schizotypy score. On the UnEx dimension, the interaction of gender and IC status was not significant ($p > .05$), in contrast to the significance of main effects of IC status ($F = 15.87$, $p < .001$) and gender ($F = 4.09$, $p = .044$) on this dimension. Only the main effect of IC status was significant on the CgDis dimension ($F = 6.74$, $p = .01$). Likewise, the ImpNon dimension was influenced solely by the IC status main effect ($F = 23.18$, $p < .001$), and not gender main effect or the interaction of these two ($p > .05$). Consequently, gender moderated the effect of IC status on overall sO-LIFE schizotypy scores, but not the UnEx, CogDis and ImpNon dimensions.

A post-hoc univariate two-way ANOVA was computed to determine the interaction of age and IC status on overall sO-LIFE and the UnEx, CogDis, and ImpNon dimensions. Age was categorized as “under 18” and “over 18”. Test of homogeneity of subpopulations by Levene’s test produced the same results for this analysis as well ($p > .05$). An interaction on overall schizotypy was not significant ($p > .05$), while main effects for age ($F = 5.27$, $p < .05$), and IC ($F = 30.75$, $p < .001$) were significant. The same was true for the interaction of these two variables on the UnEx dimension ($p > .05$). In contrast, main effects of age and IC were significant on this dimension ($F = 13.09$, and 21.11 , $p < .001$). On the CogDis dimension, main effects of both IC ($F = 11.03$) and age ($F = 10.47$) were significant ($p = .001$), but not their interaction ($p > .05$). The ImpNon was influenced only by IC ($F = 23.82$, $p < .001$).

With respect to the relation between age categories and schizotypy dimensions, t -test showed that adults (i.e., over 18) scored higher than adolescents in the UnEx ($t = 3.75$, $p < .001$) and CogDis dimensions ($t = 3.69$, $p < .001$), as well as in overall schizotypy ($t = 2.53$, $p < .05$). Table 5 shows that the scores of the CIC group in both age groups and genders are higher than the NIC group.

Table 5

Means of Overall sO-LIFE and UnEx According to IC, Age, and Gender

IC Status	Age Category	Gender	Overall sO-LIFE	UnEx	N
NIC	Under 18	female	18.03 (6.99)	5.82 (2.82)	34
		male	11.27 (4.62)	3.00 (2.65)	26
		total	15.10 (6.91)	4.60 (3.07)	60
	Over 18	female	19.60 (5.32)	6.60 (2.35)	57
		male	17.22 (6.58)	5.84 (2.35)	50
		total	18.49 (6.03)	6.24 (2.37)	107
	Total	female	19.01 (6.01)	6.31 (2.55)	91
		male	15.18 (6.59)	4.87 (2.79)	76
		total	17.27 (6.55)	5.65 (2.75)	167
CIC	Under 18	female	21.26 (6.14)	6.67 (2.65)	27
		male	21.00 (3.46)	6.33 (2.29)	9
		total	21.19 (5.55)	6.58 (2.53)	36
	Over 18	female	21.58 (6.13)	7.45 (2.39)	38
		male	21.79 (5.61)	7.50 (2.50)	14
		total	21.63 (5.94)	7.46 (2.40)	52
	Total	female	21.45 (6.09)	7.12 (2.51)	65
		male	21.48 (4.80)	7.04 (2.44)	23
		total	21.45 (5.76)	7.10 (2.48)	88
Total	Under 18	female	19.46 (6.77)	6.20 (2.76)	61
		male	13.77 (6.09)	3.86 (2.93)	35
		total	17.39 (7.06)	5.34 (3.03)	96
	Over 18	female	20.39 (5.71)	6.94 (2.39)	95
		male	18.22 (6.62)	6.20 (2.46)	64
		total	19.52 (6.16)	6.64 (2.44)	159
	Total	female	20.03 (6.14)	6.65 (2.56)	156
		male	16.65 (6.75)	5.37 (2.86)	99
		total	18.71 (6.58)	6.15 (2.74)	255

Discussion

The experience of interacting with an imaginary friend is a profound one for most children. Although most of the childhood memories are prone to being forgotten with age, many adolescents and adults are still able to recall the memory of their special friend. These companions can serve several other functions in addition to being partners in play for children; from channeling their anger and being blamed for mistakes to functioning as a mediator in communication between the child and their parents (Taylor, 1999). The presence of ICs in the lives of children goes to the extent of taking up space and sitting at dinner table with others (Ames & Learned, 1946). Furthermore, they are not always friendly and compliant or under the conscious control of the child (Taylor et al., 2007). Nevertheless, in most cases, children can tell that their ICs are make-believe and not real (Taylor & Mottweiler, 2008).

Schizotypy, as a multidimensional construct, manifests distinct profiles as a result of the interaction of its dimensions (Holt et al., 2008). Adopting a fully dimensional perspective to schizotypy, as in Claridge's model (Claridge & Beech, 1995), results in considering both adaptive and potentially pathological sides to this multidimensional construct (Mohr & Claridge, 2015). The concept of "happy schizotypes" (McCreery & Claridge, 2002) arose from this view of schizotypy, plus considering the distinct profiles emerging from different interactions of its dimensions. It was observed, then, that "happy schizotypes" are the ones that score high on positive dimension (i.e., UnEx) and simultaneously low/average on negative (i.e., IntAn) and disorganization (i.e., CogDis) dimensions of schizotypy (Grant et al., 2018).

In this study, self-reported childhood ICs was associated with higher overall sO-LIFE, and UnEx scores in adolescents and adults, with gender moderating the former but not the latter. We also found that scores on the ImpNon dimension was also higher for the CIC group; a finding that we had not predicted. There was no significant difference observed between the two groups on the IntAn dimension.

In general, these findings suggest that CIC status in adolescents and adults indicates a profile of schizotypy in line with the concept of "happy schizotype". In other words, this group of adolescents and adults scored higher than the ones without such experience on positive schizotypy (i.e., measured by the UnEx dimension), and did not differ much from the NIC group on negative (i.e., IntAn) and disorganization (i.e., CogDis) dimensions. The higher score of the CIC group on the ImpNon dimension can be discussed in light of the literature on creativity, particularly given associations in the literature between CIC and creativity.

The association between having imaginary friends and being more creative was reported in several studies (Hoff, 2005; Kidd et al., 2010; Schaefer, 1969). Likewise, the ImpNon dimension of schizotypy, in addition to the UnEx dimension, was found to be associated with creativity (Batey & Furnham, 2008; Perchtold-Stefan et al., 2021). This relation was also reported in a meta-analysis (Acar & Sen, 2013). As such, it may be indirectly concluded that adolescents and adults with the CIC experience, as the more creative ones, score higher in the ImpNon dimension as well.

Adolescents and adults of the NIC group who reported impersonation were not different from participants of the CIC group on overall sO-LIFE and UnEx. These two groups were significantly different from the NIC group without impersonation. This finding can be explained by the phenomenological (Ames & Learned, 1946) and personality (for example in the case of ToM and emotion understanding [Taylor et al., 2004]) overlaps between IC play and impersonation of imaginary characters. A crucial implication of this finding for future studies would be to measure imaginary identities along with invisible ICs and personified objects in order to better understand this related phenomenon.

The correlation of two subscales of the ASEBA-YSR (i.e., Thought Problems and Withdrawn/Depressed), and positive (UnEx) and negative (IntAn) dimensions of sO-LIFE was examined in adolescents. The strong correlation of the Thought Problems subscale with the UnEx dimension and the moderate correlation of the Withdrawn/Depressed subscale with the IntAn dimension were expected because they tap onto roughly the same domains (Kotov et al., 2020). The sharpest mean differences between the CIC and NIC groups of adolescents (with the CIC group scoring higher than the NIC group) were found on three subscales of the ASEBA-YSR; Thought Problems, Obsessive-Compulsive Problems, and PTSD Problems. The Thought Problems subscale captures symptoms (e.g., hearing voices and seeing things) similar to the items of the UnEx dimension and was introduced as a scale to measure positive schizotypy traits among children and adolescents (Kotov et al., 2020). As such, its observed difference between the two groups was in line with the findings of the main hypothesis. The Obsessive-Compulsive Problems subscale has four items in common with the Thought Problems subscale and they strongly correlated with each other among adolescents ($r = .78$).

The difference on the PTSD Problems subscale can have two explanations. First, teens with CIC history have been found to have hardship handling emotions and become more stressed about social interactions (Bonne et al., 1999), probably due to their higher attentiveness and inclination toward social situations (Gleason et al., 2003). Therefore, as four items of this subscale pertain to nervousness and tension, this might explain their higher experienced psychological distress compared to their peers. Second, one reason underlying the creation of ICs among children is in response to trauma (Taylor, 1999). This link has been discussed in the literature on dissociation as well (McLewin & Muller, 2006), albeit not necessarily meaning that having CICs predisposes

adolescents to pathological dissociation (Taylor et al., 2010). Although pathological tendencies were examined between the two groups of adolescents by comparing the scores of the ASEBA-YSR syndromes, we cannot put emphasis on the findings as a wellbeing measure was not employed in this study. Therefore, it seems crucial for the future studies of the kind to also include such measure for the purpose of reliably comparing participants with and without CIC experience according to their pathological tendencies.

The correlations of the NEO-FFI domains with sO-LIFE dimensions were examined among adults. The neuroticism domain was related to overall sO-LIFE and the CogDis dimension scores, in line with previous studies (Asai et al., 2011). This domain of the Five Factor Model (FFM) reflects vulnerability to distress (Widiger & Costa Jr, 2002), and was expected to be strongly correlated with the CogDis dimension that measures low concentration and decision-making abilities. The extraversion domain and the IntAn dimension are in many ways contrary to each other and expected to correlate negatively. Studies demonstrated that openness to experience and positive schizotypy are strongly related (Asai et al., 2011; Ross et al., 2002); a finding that was not replicated in this study. The agreeableness and conscientiousness domains showed a negative trend of correlations with sO-LIFE dimensions in this study.

The only domain of NEO-FFI that differed between the NIC and CIC group was neuroticism, where the CIC group scored significantly higher than the NIC group. This finding is in line with the aforementioned discussion (Bonne et al., 1999) of higher emotionality in this group of participants. Higher reactivity to negative emotional stressors can be one of the reasons that trigger playing with an IC in childhood.

The findings of this study can be interpreted in several ways: First, having imaginary friends in childhood can be associated with a set of personality characteristics in adolescents and adults. Capturing this set of characteristics, at least partially, in schizotypy dimensions helps us understand and explain this phenomenon more systematically. Second, considering schizotypy as a multi- and fully dimensional organization have implications for both health and psychopathology. In this regard, distinct profiles emerge from the interaction of this construct's dimensions. Third, integrating schizotypy into higher order classifications of mental phenomena aligned with the dimensional nature of this personality construct seems to improve its utility in both research and practice.

The design of this study did not benefit from random sampling which is a notable limitation for generalizability of the findings to the population. Representative sample of the adolescent and adult populations will be needed to validate these results. Additionally, longitudinal research following children with IC through their adolescence and adulthood is needed to determine schizotypy levels for a better understanding of its developmental pathway. Furthermore, in this study, reports of CIC in adolescents and adults relied solely on their retrospective accounts of this experience, which may underestimate its true prevalence (McAnally et al., 2021).

By considering the relation of having imaginary friends in childhood and evaluating a profile of “happy schizotypy,” future research can shed light on this association by investigating specific traits and states related to this profile according to IC status. Furthermore, the phenomenological accounts of IC experience with consideration of its different types (e.g., PO and invisible IC) might better capture the diversity and functions of this fantasy play in the lives of children.

Data and Material Availability Statement

Data and study materials can be obtained by contacting the corresponding author.

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Appendix

(English Translation of Imaginary Companion Questionnaire)

Initial Description:

Imaginary friends are pretend characters or creatures that you might have played with, talked with, and referred to by a specific name for a long time (at least several months). Importantly, they were seen by you to be endowed with human-like attributes and you treated them as your friend or playmate. Imaginary friends could be invisible (unobservable by others), or toys/dolls that had an air of reality for you and you played and talked with.

Imaginary identities are impersonated characters that you regularly (part of everyday, for at least several months) acted out yourself in a way that you talked like that character and liked to be called by that character's name and be treated accordingly (this excludes those kinds of role-playing games with other children in which you played the role of a doctor or a firefighter, for example).

Main Question:

1) *Based on these descriptions, have you ever had imaginary friends/identities while growing up? If yes, what kind?*

Options: *Invisible/Toy* (personified object)/*Imaginary Identities*

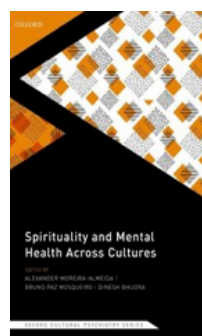
Complementary Questions:

- 1) *What was his/her name?*
- 2) *What did he/she look like?*
- 3) *What characteristics did he/she have?*
- 4) *Did he/she have a gender? What was it?*
- 5) *How often did you play with her/him?*
- 6) *Can you recall a situation of play or conversation with her/him? Describe it.*

Conceptual and Empirical Variations in Relations Between Spirituality and Mental Health¹

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A review of **Spirituality and Mental Health Across Cultures**, edited by Alexander Moreira-Almeida, Bruno Paz Mosqueiro, and Dinesh Bhugra. Oxford University Press, 2021. Pp. xviii+473, \$70.00 (Hardcover). ISBN 9780198846833

This is a volume in the Oxford cultural psychology series, consisting of twenty-five chapters divided into three major sections. Section 1 consists of nine chapters devoted to theory, while sections 2 and 3 consist of eight chapters each devoted to general principles of religions and their relation to mental health and clinical practice respectively. As can be expected in such an edited, work the structure provided by the editors, although reasonable, is not consistently followed by the authors of various chapters within or between sections. Part of this is because the theory cannot be easily separated from general principles, and general principles contain implicit if not explicit theory. Likewise, the clinical practice of integrating religion and spirituality with mental health is shaped by both theory and the general principles permissible within a culture in which religion or religions exist. As a set, the chapters are of uniformly high quality and written by authors who have established strong reputations. Most chapters have masterfully summarized often complex and controversial literatures.

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Section 1 on theory begins with a chapter co-authored by the three editors, who make a strong case for why religion and spirituality (R/S) are important for mental health. They demonstrate a remarkable grasp of the huge literature on creating a binary by having individuals identify themselves in terms of religion and spirituality. The binary creates a fourfold table where individuals can be both religious and spiritual, neither religious nor spiritual, more religious than spiritual, or more spiritual than religious. Despite slight variations in how these binaries are created (see Streib & Hood, 2016) the editors remind us that the vast majority of the world's populations are in some sense religious. The editors defend their own specific creation of a binary that is not without its critics (e.g., Ammerman, 2013). They persuasively defend the succinct view that religion includes

the institutional or communal aspects of beliefs, experience, and practices related to the sacred transcendence (p. 13). Thus, seldom will there be spirituality without some cultural expression as religion; neither will there be religion without some form of spirituality. This clear defense of the binary is crucial for the entire text. For instance, in Section 2 specific chapters are devoted to Hinduism, Buddhism, and two of the Abrahamic faiths (Judaism and Christianity). Islam is not represented. However, there is a chapter of African R/S. Obviously, to summarize the core beliefs, experience, and practices of these religions will be highly selective and represent the personal views of the scholars who wrote the chapters. The views on specific religions are unlikely to represent complex faith traditions in other than a cursory sense and likely lacking in consensus from serious scholars in religious study. Definitions of religions are unlikely to be approved by other than those who make them and it is clear that there is as much diversity with the "same" religion as there is between one religion and another (Hood, Hill, & Spilka, 2018, pp. 1-9). However, what is clear is that however religions are defined and characterized, the issues of mental health are of concern.

How significant theoretical issues raised in Section 1 interact with the description of R/S in Section 2 is illustrated by two excellent chapters that raise serious methodological issues in how R/S is defined and studied. Chapter 17, written by Bruno Paz Mosqueiro, focuses on one expression of the binary, those who identify as spiritual but not religious (SBNR). He argues that the SBNR are missidentified and are better described as "spiritual and multi-religious" (p. 298). This is a clever argument, partly supported by empirical evidence with



the vast majority of the world's population placed under some religious umbrella even if one of their own syncretic creations. Hence, it follows that mental health professionals need to explore the near universality of R/S and their relations to mental health issues (which for the authors in this text are primarily positive and only rarely negative). However, this is partly a confound based upon conceptual and methodological critiques well-articulated by Miguel Farias and Thomas J. Coleman III in Chapter 15 of Section 2. Their chapter is devoted to non-religion, atheism, and mental health. They fiercely critique the claim that those who identify as non-religious or affirm atheism can be studied by procedures common in the empirical psychology of religion. They argue that to make atheism or non-religion a topic under *religions* is to make two serious conceptual mistakes with serious methodological consequences. The first is to confuse low scores on R/S belief (however measured) as the absence of theist beliefs. The result is that mental health is assessed by criteria atheists and non-believers reject. Thus, they receive lower scores on mental health. On the other hand, higher scores on measures of R/S beliefs are confounded with evaluating mental health in terms that conceptually overlap and are favorable to R/S beliefs. Thus, the claim that R/S is associated with positive mental health outcomes and that those who lack R/S beliefs are lower on mental health outcomes is a methodological artifact, not a legitimate empirical conclusion. Farias and Coleman III argue that it is as if one used the low score on an omnivore scale to draw inferences about the psychology of vegans (p. 263). Thus, the immensely and interesting discussion of R/S in Section 2 is mired in crucial conceptual, philosophical, and theological issues that need more attention. It is to the editors' credit that they have not shied away from including critical chapters that raise critiques damaging to their own largely positive views of R/S's influence on mental health. However, the dark side of R/S remains only minimally explored in the twenty-five chapters. A chapter devoted to the negative effects of R/S would have been a valuable addition.

A second chapter in Section 1 adds another critique to the editor's overall enthusiasm for the positive role of R/S in mental health. In it, German S. Berrios and Ivan S. Marková note that in the last twenty years the literature of spirituality has grown to be "unmanageable" (p. 28). Much of this they attribute to the lack of concern with ontology on the part of those who research and those who apply the results of research in their health care or practice. Another chapter in Section 1 also raises the issue of the scientific study of spiritu-

ality (Harald Walach in Chapter 4). One of the great values of this edited text is the range and acknowledgement of the conceptual and methodological issues raised by the editor's strong commitment to the view of the overall largely positive contributions R/S make to mental health. Having allowed the critics a voice, the chapters in Section 3 make the editors' compelling case that R/S has a largely positive role to in mental health.

The key to understanding the importance of Section 3 is that major organizations concerned with the licensure and training of mental health professionals have strong statements on principles for integrating R/S into practice for mental health professionals. Sections 1 and 2 make the case that spirituality is the term most likely to be used among health care professionals as a generic term that becomes specific when the belief, practices, and experiences are communally shared as specific religions. Chapter 18 (by Christopher Cook and Alexander Moreira-Almeida) provides the World Psychiatric Association's position statement on integrating R/S in mental health care. It is a huge umbrella that has influenced many other national and regional organizations that provide licensure for organization that provide healthcare or other mental health services for which R/S is relevant. Most follow the need for explicit requirement to obtain informed consent after full disclosure. It is assumed that often persons are attracted to health care careers because of their own R/S motivations. The crucial issues are that mental health professionals must be aware of the benefits and risks of what are world-views that included R/S and more secularized way of perceiving and acting in the phenomenal world. Ignoring ontological questions allows mental health professionals to work with the R/S beliefs of their patients or clients and when necessary and to consults with other experts in specific faith traditions they may not be familiar with. The issue is not that things believed to be true must be ontologically true from a scientific, evidence-based worldview that only deals with the phenomenal reality of how humans perceive reality. The concern of the practitioner is neither to deprive clients or patients of their R/S beliefs nor to ignore them as outside their responsibility as caregivers. Instead, the task is to engage the R/S beliefs of those who with full disclosure and informed consent seek the benefits that may derive from R/S beliefs relative to their own mental health. Ontological claims are simply ignored.

Section 3 can best be explored by the names of the chapters that read as a useful set of tutorials, from the need to take a culturally-sensitive evidence-based spiritual history (Chapter 19, by Larkin Kao and Joh Pe-teet), to discussion of spiritually integrated psychotherapies (Chapter 22, by Marianne de Abreu Costa and

David Rosmarin), to how to handle spiritual struggles within therapy (Chapter 23, by Kenneth Pargament and Julie Exline). Included are R/S guides for the prevention and promotion of mental health (Chapter 20, by Arjan Braam) and the importance of R/S in end-of-life care (Chapter 24, by Peter Fenwick and Bruno Paz Mosqueiro). One can view Section 3 as the best practice evidence supporting the enthusiasm of the editors for the largely positive role R/S plays in mental health. Although R/S tools vary between cultures, they are available in some form in all nearly cultures. In most, R/S is the the norm not the exception. A chapter devoted to how R/S communities world-wide can cooperate to foster mental health (Chapter 25, by Wai Fung et al.) is timely in a period dominated by concerns with pandemics, climate change, and threats once again of a world war. Chapter 21 (by Simone Hauck and Robert Cloninger) relates R/S concerns to positive psychiatry and psychology. The issue of whether hope can be seen as functionally equivalent to faith is only partly an empirical question. It allows us to consider if the strong case for the positive contribution of R/S to mental health in the chapters of Section 3 is persuasive enough, especially considering the effort to avoid ontological issues.

This text is a nice complement to what for many is the classic text, which can be read as a prolegomenon to this book, William James's Gifford lectures published as the *Varieties of Religious Experience* (hereafter *VRE*) subtitled, *A Study in Human Nature* (James, 1985). In lecture 1 (1985, pp. 11-29), James famously introduced his concern with medical materialism, especially when it tries to avoid ontological claims and address only the phenomenal. Whether Saul's epilepsy on the road to Damascus or Teresa's hysteria, James declared that it might be that such illnesses, if that is what are, are not *merely* illnesses. James was widely criticized for his claim that in such psychiatric illness may lie ontological truths of contact with what he referred to as something "MORE" that is continuous with our nature (1985, p. 401). Early reviews of the *VRE* chastised James for thinking that psychology could preserve its scientific status and yet claim ontological significance for what must be evidence-based exploration of the purely phenomenal (Campbell, 2016). James insisted that madness may be *necessary* for the ontological truths of spiritual realities to be recognized. In an early review of *VRE*, James was criticized for his claim that the subliminal consciousness provided an access to genuine spiritual realities as a "curious departure from the pathways of science" (French, 1905, p. 703). Yet James warned that to ignore ontological claims of spiritual experiences replaces a commitment only to phenomenal reality. A psychology that would be scientific necessarily misconstrues experience, "For the hysterical nun, starving for natural life,

Christ is but an imaginary substitute for a more earthy of affection" (James, 1985, p. 18). Throughout Section 3, the evidence-based claims clearly document how R/S can be used to promote mental health. but that is only half the story. James takes seriously the possibility that religion is itself an expression of madness and if so, absolutely authoritative for the person who has this ontological awareness of being engaged in spiritual reality not simply of their own construction. Of course, some experiences might be only phenomenal but only if others are veridical. This is the conceptual dilemma hidden if the focus is only on evidence-based documentation at the phenomenal level. James thought psychology could do more than be bound by the phenomenal. It could admit the reality of spiritual worlds into its own worldview. Thus, in a sense, the advancement of the study of R/S and their positive contribution to mental health and the *prevention* of madness mimics Shakespeare's *Hamlet*. Are those concerned with the relation between mental health and R/S trying to lift themselves by their own petard?

James's insight was that the relation between individual experience and collective shared experience is ontologically relevant beyond the phenomenal reality of culturally shared worldviews (mostly but not exclusively R/S ones) For the R/S caregivers, committed to the positive role of R/S in mental health there is a warning:

A *genuine* first-hand experience is bound to be a heterodoxy to its witness, the prophet appearing as a lonely madman. If this doctrine proves contagious enough to spread to any others, it becomes a definite labeled heresy. But if it then proves contagious enough to triumph over persecution, it becomes an orthodoxy, its day of inwardness is over; the spring is dry; the faithful live at second hand and stone the prophets in their turn. (James, 1985, p. 270, emphasis added)

This handbook is marvelous and even a necessary read for mental health caregivers who can no longer avoid R/S issues in their profession. However, what at first glance is a progressive articulation to explore R/S and secular version of these worldviews (such as Positive Psychology) upon more reflection becomes an effort to defend their own limited phenomenal worldviews. It remains unclear that this text, seen as a complementary text to James' *VRE* can be fully appreciated without seeing it as carefully avoiding the ontological issue because of the own limits it sets upon itself. Yet, if we are willing to assume with James (1985) "That the sanest and best of us are of one clay with lunatics and prison inmates, and death finally runs the robustest of us down" (p. 46)

then trying to avoid the ontological issue is a mistake and no additional data can resolve it (Papanicolaou, p. 2021). The cliché common in America is that the inmates are running the asylum. Would that be so bad?

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Recent Publications of Note¹

Etzel Cardeña

Lund University

Anomalous Experiences

Aday, J. S., Davis, A. K., Mitzkovitz, C. M., Bloesch, E. K., & Davoli, C. C. (2021). Predicting reactions to psychedelic drugs: A systematic review of states and traits related to acute drug effects. *ACS Pharmacology & Translational Science*, 4, 2, 424–435. <https://doi.org/10.1021/acspsci.1c00014>

From the abstract (see also Russ et al., below): Individuals high in the traits of absorption, openness, and acceptance as well as a state of surrender were more likely to have positive and mystical-type experiences, whereas those low in openness and surrender or in preoccupied, apprehensive, or confused psychological states were more likely to experience acute adverse reactions. Participant sex was not a robust predictor of drug effects, but 5-HT_{2A}R binding potential, executive network node diversity, and rACC volume may be potential baseline biomarkers related to acute reactions. Finally, increased age and experience with psychedelics were individual differences related to generally less intense effects.

Boyle, J. (2021). From metapsychology to magnetic gnosis: An esoteric context for interpreting traumatic modes of transcendence in Sándor Ferenczi's *Clinical Diary* and Elizabeth Severn's *The Discovery of the Self*. *Psychoanalysis and History*, 23(3), 297-323. <https://doi.org/10.3366/pah.2021.0396>

A long discussion of the foundational psychoanalyst Ferenczi, who was cognizant of psychical research and proposed that exposure to trauma can give rise to a propensity to experience anomalous experiences and cognition.

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

Duarte, B. A., Joseph, A.-L. C., Falcone, G., & Jerram, M. (2021). From daydreaming to dissociation: An exploratory study on the role of thought suppression and dissociation in fantasy prone individuals. *Psychology of Consciousness: Theory, Research, and Practice*. Advance online publication. <https://doi.org/10.1037/cns0000304>

Explores the relation between fantasy proneness (FP) and dissociation and concludes that “thought intrusion mediated the relationship between FP and dissociation, while suppression effort did not.”

Merckelbach, H., Otgaar, H., & Lynn, S. J. (2021). Empirical research on fantasy proneness and its correlates 2000–2018: A meta-analysis. *Psychology of Consciousness: Theory, Research, and Practice*, 9(1), 2–26. <http://dx.doi.org/10.1037/cns0000272>

From the abstract: Effect sizes were large ($r_s > .50$) for [the relation between fantasy proneness and] hallucinatory experiences, magical ideation, perceptual aberration, dissociation, and excessive daydreaming. Contrary to the popular idea that childhood trauma is a prominent precursor of fantasy proneness, we found that the effect sizes for self-reported trauma were small, as was also the case for depression, anxiety, and memory illusions ($r_s < .30$).

Parnia, S., Post, S. G., Lee, M. T., Lyubomirsky, S., Aufderheide, T. P., Deakin, C. D., Greyson, B... Shirazi, T. K. (2022). Guidelines and standards for the study of death and recalled experiences of death—a multidisciplinary consensus statement and proposed future directions. *Annals of the New York Academy of Sciences*, <http://dx.doi.org/10.1111/nyas.14740>

A panel of experts suggests terminological and conceptual guidelines to further the study of near-death experiences and related phenomena.

Rabeyron, T. (2022). When the truth is out there: Counseling people who report anomalous experiences. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2021.693707>

This paper presents “the core components of a Psychodynamic Psychotherapy focused on Anomalous Experiences (PPAE) based on three main steps: phenomenological exploration, subjective inscription and subjective integration of the anomalous experience.

Rahtz, E., Warber, S.L., Goldingay, S. *et al.* Transcendent experiences among pilgrims to Lourdes: A qualitative investigation. *Journal of Religion and Health*, 60, 3788–3806. <https://doi.org/10.1007/s10943-021-01306-6>

From the abstract: “We spoke with 67 pilgrims... young volunteers and medical staff. About two in five reported a transcendent experience: some felt they had communicated or had close contact with a divine presence, while others reported a powerful experience of something intangible and otherworldly.”

Russ, S. L., Carhart-Harris, R. L., Maruyama, G., & Elliott, M. S. (2019). States and traits related to the quality and consequences of psychedelic experiences. *Psychology of Consciousness: Theory, Research, and Practice*, 6(1), 1–21. <https://doi.org/10.1037/cns0000169>

From the abstract: “A state of surrender at the start of the psilocybin session most strongly explained MEs [mystical experiences], and a state of preoccupation most strongly explained challenging experiences. The trait absorption was a strong secondary predictor in both models, along with smaller predictors. Additionally, the occurrence of MEs during the psilocybin session explained long-term positive change.”

Stumbrys, T. (2021). Dispelling the shadows of the lucid night: An exploration of potential adverse effects of lucid dreaming. *Psychology of Consciousness: Theory, Research, and Practice*. Advance online publication: <https://doi.org/10.1037/cns0000288>

From the abstract: “[L]ucid dream frequency was not associated with poorer sleep quality or with greater dissociation but was linked to greater mental well-being. Moreover, most of the lucid dreams were reported to

be emotionally positive experiences and the majority of lucid dreamers did not ascribe any negative consequences to lucid dreaming.”

Taves, A., & Barlev, M. (2022). A feature-based approach to the comparative study of “nonordinary” experiences. *American Psychologist*. Advance online publication. <http://dx.doi.org/10.1037/amp0000990>

A call for a multidisciplinary, phenomenological approach to the study of anomalous/ nonordinary experiences. It is notable that this paper was published by the flagship journal of the American Psychological Association.

Thomas, D. (2021). A participatory research study to explore the healing potential of children’s anomalous experiences. *Explore. The Journal of Science and Healing*, Advanced online publication: <https://doi.org/10.1016/j.explore.2021.08.012>

A qualitative study in which children/teens anomalous experiences were experienced as having healing and transformational potential.

Anomalous Cognition

Butzer, B. (2021). Does synchronicity point us towards the fundamental nature of consciousness?: An exploration of psychology, ontology, and research prospects. *Journal of Consciousness Studies*, 28(3-4), 29-45.

A review of the concept of synchronicity and a call to develop ways to investigate it.

Luke, D. (2022). Anomalous psychedelic experiences: At the neurochemical juncture of the humanistic and parapsychological. *Journal of Humanistic Psychology*, 62(2), 257-297. Doi: 10.1177/0022167820917767

From the abstract: “This article explores the nature of psychedelically induced anomalous experiences for what they reveal regarding the nature of “expanded consciousness” and its implications for humanistic and transpersonal psychology, parapsychology, and the psychology and underlying neuroscience of such experiences.”

Müller, M. & Wittmann, M. (2021). Anomalous cognition in the context of time: Does the viewer describe a deterministic or a probabilistic future? *Journal of Scientific Exploration*, 35(3), 442-569.

Experienced remote viewers sought to view targets determined either in the present or the future. Both conditions showed significant hitting, with the present condition showing a significantly higher effect than future one.

Radin, D. (2022). (2022, March 13). Anomalous entropic effects in 23 years of continuously recorded truly random data: An exploratory analysis. <https://doi.org/10.31234/osf.io/uavde>

Analyses of 23 years of the Global Consciousness Project supports the hypothesis that events drawing the attention of a large amount of people produces temporary coheres in random physical systems.

Sarraf, M., Woodley of Menie, M. A., & Tressoldi, P. (2020). Anomalous information reception by mediums: A meta-analysis of the scientific evidence. *Explore. The Journal of Science and Healing*, 17(2). <https://doi.org/10.1016/j.explore.2020.04.002>

A meta-analysis of experiments with mediums finds support from frequentist and Bayesian analyses that they produce more accurate information about deceased individuals than would be expected by chance.

Sudduth, M. (2021). The James Leininger case re-examined. *Journal of Scientific Exploration*, 35(4), 933-1026. <https://doi.org/10.31275/20212359>

A philosopher who has published on the arguments for and against possible survival investigated the recent and well-publicized case of James Leininger. He concludes that his investigation raises serious questions about the solidity of this cases as presented by investigator James Tucker. Responses by Tucker and James Matlock will be published in a forthcoming issue of this journal.



Journal of Anomalous
Experience and Cognition