

# Siddhis and Psi Research: An Interdisciplinary Analysis\*

## *Abstract*

Psi experiences, or siddhis, are one among many varieties of human experiences reported from ancient times across cultural and geographical boundaries. The data and theories from psi research inform philosophical debates on the nature of time, causality, information and their implications for the free-will–determinism debate. In this article we present an overview of theoretical approaches of psi research, and the varieties of siddhis mentioned in classical Indian literature. Further, we examine siddhis in relation to the findings from contemporary psi research, with particular reference to informational psi, along the dimensions of training, personality, and meditation.

## *Keywords*

Siddhis, Psi research, Extrasensory Perception.

»If scientific analysis were conclusively to demonstrate certain claims in Buddhism to be false, then we must accept the findings of science and abandon those claims.«

Dalai Lama XIV, *The Universe in a Single Atom: The Convergence of Science and Spirituality*

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\* Edward F. Kelly served as one of the blind referees for Sonali Bhatt Marwaha's article 'Siddhis and Psi Research.' Since Kelly's report in our view highlighted issues which we believe could be of interest to our readers, but which, however, exceeded the scope of Marwaha's article, we, the editors, decided to reveal Marwaha's and Kelly's identities to one another and to request from Kelly a brief discussion of his own views on psi research. We are pleased that both Sonali Bhatt Marwaha and Edward Kelly agreed to this intellectual exchange seeing as we believe that it advances the current debate. We are particularly grateful to Marwaha in this regard since this format did not allow her the opportunity to respond to Kelly's statement.

## 1 Introduction

Since the 1930s, Indian philosophy began its transformation into an Indian psychology. Indian psychology is derived from classical Indian thought that offers fruitful psychological models and theories that hold pan human interest. »Indian psychology« is the name used by those who pioneered in the area of applying classical Indian thought to contemporary psychology. Numerous books have been published that seek to expand on a psychology based in Indian philosophical systems. Examples include, Jadunath Sinha's three volumes titled *Indian Psychology* (1933/1958), Rhys Davids' *The Birth of Indian Psychology and Its Development in Buddhism* (1936), Raghunath Safaya's *Indian Psychology* (1976), B. Kuppuswamy's *Elements of Ancient Indian Psychology* (1985) (Rao 2008: 3).<sup>1</sup> Recent publications include *Towards a Spiritual Psychology* (Rao, and Marwaha 2005)<sup>2</sup>, *Handbook of Indian Psychology* (Rao, Paranjpe, and Dalal 2008), and *Foundations of Indian Psychology* (Cornelissen, Misra, and Varma 2011)<sup>3</sup>.

According to Rao (2008: 7), »Indian psychology has consciousness as its core concept. Centrality of consciousness is its defining characteristic. Consciousness is considered to be a primary principle irreducible to brain states. The brain does not generate consciousness; it simply reflects consciousness and often by filtering, limiting and embellishing it.« While this emphasizes only dualist and idealist views, the materialist view in the Indian tradition has largely been ignored. The materialist schools in Indian philosophy include early Tantra, pre-classical Sāṃkhya, Lokāyatā/Cārvāka schools, and contributions by some Buddhist and Jaina scholars. Modern Indian philosophers include Debiprasad Chattopadhyaya, M. N. Roy, J. Bandopadhyaya, S. Joshi, K. K. Mital, S. N. Prasad, Ramakrishna Bhattacharya and P. P. Gokhale. In Chattopadhyaya's (1973: 335)<sup>4</sup> analysis, »the

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<sup>1</sup> K. R. Rao, »Prologue: Introducing Indian Psychology,« in K. R. Rao, A. C. Paranjpe, and A. K. Dalal (eds.), *Handbook of Indian Psychology*, New Delhi: Foundation Books, 2008, pp. 1–18.

<sup>2</sup> K. R. Rao, and S. B. Marwaha, *Towards a Spiritual Psychology: Essays in Indian Psychology*, New Delhi: Samvad India Foundation, 2005.

<sup>3</sup> M. Cornelissen, G. Misra, and S. Varma, *Foundations of Indian Psychology*, Delhi: Pearson, 2011.

<sup>4</sup> D. Chattopadhyaya, *Lokāyatā: A Study in Ancient Indian Materialism*, Delhi: People's Publishing House, 1973.

search for the inner truth within the body led the [early] Tantrikas not to any subtle non-physical spiritual principle but rather to the human nervous system in its essentially physical aspect.« An overview of the roots of Indian materialism can be found in Marwaha (2013)<sup>5</sup>.

Supporting the transition of Indian philosophy to Indian psychology is experimental philosophy, which paves the way for putting to test philosophical constructs, whether ancient or modern. Experimental philosophy is an interdisciplinary field that applies the methods of psychological science to examine traditional philosophical problems (Lombrozo, Knobe, and Nichols 2014: 1)<sup>6</sup>.

As may often be the case, questions in one field may have been partially addressed in another field, and the next step forward requires synergy between the disciplines. Examining siddhis – psi in the Western tradition – is a case in point. Psi research includes informational psi (extrasensory perception/anomalous cognition), mind-matter interaction (psychokinesis), and survival research (reincarnation, near-death experiences, out-of-body experiences, and mediumship research). With a vast body of experimental literature, much is known today about psi even though much remains to be known.

In this article we bring the reader up-to-date with the current theoretical advances in psi research, and aim to bridge the classical Indian understanding of siddhis with data from experimental psi research, with specific reference to informational psi. While a variety of siddhis are mentioned in different philosophical/theoretical systems, they generally fall within the same categories as those mentioned in the *Yoga Sūtras* (YS), thus, we use the YS as our point of reference<sup>7</sup>.

In the following we present a brief overview of psi in Indian thought, wherein we discuss (a) psi in Tantra, (b) psi in Buddhist and Jain thought, and (c) The *Yoga Sūtras* (Section 2). This is followed by, in Section 3, an overview of concepts in contemporary psi research, which includes (a) the fundamental problem of informational psi, and

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<sup>5</sup> S. B. Marwaha, »Roots of Indian Materialism in Tantra and Pre-Classical Sāṃkhya,« *Asian Philosophy*, Vol. 23, No. 2, 2013, pp. 180–198.

<sup>6</sup> T. Lombrozo, J. Knobe, and S. Nichols, *Oxford Studies in Experimental Philosophy, Volume 1*, Oxford: Oxford University Press, 2014.

<sup>7</sup> Interpretations of *Yoga Sūtras* referred to here are from Taimni (1961) and Rao (2011). See: I. K. Taimni, *The Science of Yoga: The Yoga-sūtras of Patañjali in Sanskrit with Transliteration in Roman, Translation in English and Commentary*, Wheaton, IL: Theosophical Pub. House, 1961.

(b) theoretical approaches to psi phenomena. Further, we discuss the dimensions along which contemporary psi research has cast light on the yoga theory of siddhis with specific reference to (a) training, (b) personality, and (c) meditation in Section 4. This is followed by the concluding comments in Section 5. In an interdisciplinary work such as this, space limitations constrain the depths that can be discussed here. All the schools and concepts alluded to here have a very large body of work and diverse theoretical viewpoints behind them; no doubt this brief article does not do justice to all views and the depth of ideas and discussions behind them. References cited in this work serve as good sources for in-depth information for the various areas mentioned.

## 2 Psi in Indian Thought

Psi experiences are one among many varieties of human experiences reported from ancient times across cultural and geographical boundaries. They have been discussed in classical Indian philosophies including Hindu Tantra (~500–600 CE), Jain (~400–300 BCE), Buddhist (~400 BCE), Nyāya (~300 BCE), Vaiśeṣika (~200 BCE), and in the more systematized text of Patañjali's *Yoga Sūtras* (~200 CE), including critiques by the Lokāyatā (~500 BCE) and Mīmāṃsā (~400 BCE).

In discussing psi in various schools of classical Indian thought, Sinha (1958: 334)<sup>8</sup> states:

The Indian treatment of super-normal perceptions is more descriptive than explanatory. [...] Super-normal perceptions are above the general laws and conditions of normal perceptions. They transcend the categories of time, space, and causality, and apprehend the real nature of things divested of all their accidental associations of names, concepts, and so forth. So we cannot understand their nature by appealing to the facts of ordinary perceptions. We must have a conception of these higher grades of super-normal perception on the basis of speculation, unless we ourselves attain the stage of higher intuitions.

In reading Sinha and his account of various philosophers from all the schools, it becomes evident that speculation regarding the occurrence

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<sup>8</sup> J. Sinha, *Indian Psychology, Cognition*, Calcutta: Sinha Pub. House, 1958.

of psi experiences were embedded within the core constructs of the particular school, but with sufficient differences between scholars within a school. Sinha (1969)<sup>9</sup> also discusses the epistemological values of psi perceptions according to various classical scholars. In the following, a brief description of types of psi in Tantra, Buddhist, Jaina, and Yoga are listed.

### *Psi in Tantra*

Early Tantra was a pre-spiritualistic, pre-Vedic, primitive proto-materialism. The early Tantra view has no reference to soul, god, liberation, heaven, prayer or sacrifice, karma, or afterlife. It perceived the human body and nature as two aspects of the same fundamental reality. It believed in the productive activity of nature and the female principle. Early tantriks explored the nervous system; (for example, *cakras* and *nādi* may essentially be early understanding of the nervous system), and they concluded that the brain is the seat of consciousness. Consciousness did not occupy a central position in their worldview. The later Tantra, what most modern readers are familiar with, was cast upon the model of the metaphysics of Classical Sāṃkhya, and hence takes on a dualist understanding of reality (Chattopadhyaya 1973<sup>10</sup>; Marwaha 2013; Sinha 1958).

According to Feuerstein (1998: 4)<sup>11</sup>, in later Tantra, *siddhi* »can refer either to the spiritual attainment of liberation, or enlightenment, or to the extraordinary powers or paranormal abilities ascribed to Tantric masters as a result of enlightenment or by virtue of mastery of the advanced stages of concentration.« Tantra, and Yoga in general, recognize eight great paranormal powers, called *mahā-siddhis*: (1) *Aṅīmā* (atomization), the ability to make oneself as small as an atom (*aṅu*), implying invisibility. (2) *Mahima* (magnification), the ability to make oneself infinitely large. (3) *Laghima* (levitation), the ability to defy the law of gravity, or in the words of Vijñāna Bhikṣu's *Yoga-Varttika* (3.45), »to become as light as a cotton tuft on a pain-

<sup>9</sup> J. Sinha, *Indian Psychology, Perception*, Calcutta: Sinha Pub. House, 1969.

<sup>10</sup> D. Chattopadhyaya, *Lokāyatā: A Study in Ancient Indian Materialism*, Delhi: People's Publishing House, 1973.

<sup>11</sup> G. Feuerstein, *Tantra: The Path of Ecstasy*, Boston: Shambhala, 1988.

ter's brush« (*ibid.*). (4) *Prāpti* (extension), in the words of the *Yoga-Bhāṣya* (3.45), the ability to »touch the moon with one's fingertips« (*ibid.*). (5) *Prākāmya* (will), the ability to exert one's will without obstruction. For instance, the *yogin* who possesses this power can, according to the *Yoga-Bhāṣya* (3.45), dive into the earth as if it were water. (6) *Vaśitva* (mastery), the ability to control the five material elements (*bhūta*) and their subtle templates (i. e., the five *tanmātra*). (7) *Isītriva* (lordship), the ability to completely control the manifestation, arrangement, and destruction of the elements and the objects composed of them. (8) *Kāmasavasayitva* (from *kāma*, »desire,« and *avasayitva*, »fulfillment«), the ability to have all one's desires fulfilled by controlling the very nature of the elements (*ibid.*: 264–265).

### *Psi in Jaina and Buddhist Thought*

In Jaina epistemology knowledge is of two kinds: indirect and direct. Indirect knowledge is of two kinds, perceptual awareness obtained through sensory processes and knowledge received through scriptural authority. Direct knowledge is transcendental perception, or extra-sensory knowledge, and is of three types: (1) awareness unbound by space and time termed *kevala jñāna*, (2) knowledge of events and objects remote in space and time called *avadhi* and (3) direct knowledge of thoughts of others known as *manahparyāya* (Rao 2011: 254)<sup>12</sup>. Clairvoyant knowledge (*avadhi*) is not mediated by the senses, because it arises without the involvement of the mind. The mind in Jaina theory is also material, but of a different kind from the physical, and manifests in ever fluctuating modes (*manahparyāya*). Telepathic knowledge arises from knowing these modes/states of the mind without any sensory aids. There are some differences among Jaina thinkers whether *manahparyāya* gives only the state of another mind from which one infers the relevant objects of thought or whether it gives direct access to the objects of other's thought (*ibid.*: 524–526).

In the Buddhist theory of knowledge, perception (*pratyakṣa*) – distinguished from imagination – is regarded as the foundational

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<sup>12</sup> K. R. Rao, *Cognitive Anomalies, Consciousness and Yoga*, New Delhi: Centre for Studies in Civilizations for the Project of History of Indian Science, Philosophy and Culture and Matrix Publishers, 2011.

means of obtaining knowledge (*pramāṇa*) insofar as inference (*anumāna*) depends on it (Bhatt 2008: 315)<sup>13</sup>. Perception is further classified into *indriya pratyakṣa* (sense perception), *mānasa pratyakṣa* (mental perception), *svasamvedana pratyakṣa* (self cognition), and *yogi pratyakṣa* (mystic perception). Mystic perception is produced from the »subculminated state of deep meditation on a fundamental reality« (*ibid.*: 334). Yogic perception should, in short, be: (a) unobtainable through other valid sources of knowledge; (b) confirmed by later experience; and (c) devoid of any element of supposition (*kalpanā*).

Kalupahana (2008: 79–80)<sup>14</sup> lists the extraordinary perceptions or powers recognized in early Buddhism: (1) Psychokinesis (*iddhiividha*), which is not a form of knowledge but a power, consists of various manifestations of the »power of will« during the contemplations. (2) Clairaudience (*dibba sota*), the faculty of perceiving sounds even at a distance, far beyond the reach of ordinary auditory faculty. This extension of the auditory perception both in extent and in depth enables a person to perceive directly certain correlated phenomena that are otherwise only inferred. (3) Telepathy (*cetopariyañāṇa*), which enables one to comprehend the general state as well as the functioning of the mind of another person. (4) Retrocognition (*pubbenivāsānussati*), the ability to perceive one's own past history, is dependent on memory and brings out the information, not only of the past in this life, but also some of the past lives where the impressions have been rather strong. (5) Clairvoyance (*dibbacakkhu* or *cut'upapatañāṇa*), the knowledge of the deceased and survival of other beings who wander along in the life process conditioned, among other factors, by one's own behavior. The Buddhist description utilizes the present participle as »sees beings who are passing away, are being born and moving according to their deeds« (*ibid.*: 80).

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<sup>13</sup> S. R. Bhatt, »Indian Theories of Perception: An Inter-School Dialogue from Buddhist Perspective,« in Rao et al. (2008: 313–335).

<sup>14</sup> D. J. Kalupahana, »The Foundations of Early Buddhist Psychology,« in Rao et al. (2008: 73–84).

*The Yoga Sūtras*

»The leading idea of Patañjali's philosophy is that all things result from the action of spirit upon matter; that the universe arose from the reflection of spirit upon matter in a visible form.«  
Tātyā, and Olcott (2013 [1885]: ix)<sup>15</sup>

The eight-limbs of yoga, as enumerated by Patañjali, are *yama* (restraints), *niyama* (observances or disciplines), *āsana* (physical posture), *prāṇāyāma* (breath control), *pratyāhāra* (control or withdrawal of the senses), *dhāraṇā* (concentration), *dhyāna* (meditation) and *samādhi* (state of super-consciousness) (YS II.29). Vibhūti Pāda, Part III of the *Yoga Sūtras*, deals primarily with siddhis. *Dhāraṇā* is the practice of focused attention on an object or thought. *Dhāraṇā* thus takes into account the intentional nature of the mind at this stage. *Dhyāna* is prolonged, continuous and unwavering concentration on a single object. *Samādhi* is a resultant state in which the distinction between the knowing subject and the object disappears; only the object of focus is in awareness; and the subject is »absorbed« in it. The three together refer to *saṃyama* or meditation (Rao 2011: 611–612).

According to Patañjali, siddhis or supernormal powers are obtained by *saṃyama* or perfect meditation, leading to clarity of insight. This enables the yogin to gain knowledge of the past and future. This is possible both for objects and the knowledge of the mind of another person, when *saṃyama* is done on an object or the mind of another. This knowledge is generated purely by the mind. In Part III of the YS, Patañjali covers a wide variety of siddhis.

The varieties of siddhis noted by Patañjali include those that: give extraordinary knowledge, including the awareness of thoughts in other's minds (YS III.16–20); give one excellence in bodily functions, including the ability to become invisible (III.21); develop clairvoyant abilities and know the distant, hidden and subtle objects (III.25). Others enable gaining insight into celestial things such as stars (III.27), gaining knowledge of one's anatomy (III.29), overcoming hunger and thirst (III.30), enable one's thought entering into the body of another person (III.38), the ability to walk on water or a bed of thorns (III.39) and move in space (III.42). In addition, Patañjali

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<sup>15</sup> T. Tātyā, and H. S. Olcott, *The Being the Text with Patañjali, With Commentary*, London: Forgotten Books, 2013 [1885].



refers to extraordinary sensory abilities as well as gaining nonsensory intuitive knowledge, such as supernormal hearing, feeling, sight, taste and smell (III.36), and intuitive awareness (III.25, 33) (Rao 2011: 521).

In addition to these, the YS mention eight *mahāsiddhis* (great powers). They include the power to expand into space and become big, the power to become light, the power to become heavy, the power to reach out anywhere, the power to realize any wish, the power to create, the power to command and conquer. While these siddhis do not come within the purview of psi research, it must be noted that these may refer to siddhis of the experiential self, rather than the physical self. As Rao (2011: 521) notes, »It is difficult to discern whether some of these are metaphorical allusions or genuine phenomena. The description of powers is often very terse leaving room for ambiguity.« As Braud (2010: 247)<sup>16</sup> analyzes:

Some of the siddhis are relatively mundane, some physiological, some psychological, some paranormal, some spiritual and mystical. Some of these might be understood as the fruits of ordinary deep thinking or pondering, whereas others might be resultants of other forms of knowing – direct knowing, insight, intuition, or revelation. Some of the siddhis (e.g., knowing the thoughts of others; clairaudience, knowledge of the subtle, concealed, and remote) are identical, or similar, to forms of receptive [informational] psi.

As is well known, there are substantial difficulties in the understanding of classical texts because the exact significance of the text is lost in interpretation, and the subsequent analyses of the *sūtras* are influenced by the views of the commentator, including the changing times and knowledge base during which the interpretations are made. This makes it difficult to determine what the ›authentic‹ translation is. As Rao and Paranjpe (2008: 188)<sup>17</sup> note, »While Yoga as a system of philosophy is clearly related to Sāṃkhya and makes similar metaphysical assumptions with very minor variations, the commentators on Patañjali's *Yoga-Sūtras* belong to various philosophical persuasions, varying from realism to idealism and dualism to monism.«

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<sup>16</sup> W. G. Braud, »Patañjali Yoga and Siddhis: Their Relevance to Parapsychological Theory and Research,« in Rao et al. (2008: 217–243).

<sup>17</sup> K. R. Rao, and A. C. Paranjpe, »Yoga Psychology: Theory and Application,« in Rao et al. (2008: 186–216).

### 3 Contemporary Psi Research

From antiquity, humankind has come a long way in understanding the nature of Nature. Organized and sustained psi research as a scientific pursuit dates its formal start to February 20th, 1882, with the establishment of the Society for Psychical Research (SPR) in London (Zingrone, and Alvarado 2015)<sup>18</sup>.

Nomenclature has changed over the decades, with the accumulation of experimental data and a greater understanding of the phenomena. Since the 1980s, as part of the Star Gate program<sup>19</sup>, May, Spottiswoode, and James (1994a)<sup>20</sup> adopted the term »anomalous mental phenomena« (AMP) instead of the more widely known psi. Likewise, they use the terms »anomalous cognition« (AC)<sup>21</sup> (which has now gained acceptance), and »anomalous perturbation« (AP) for extrasensory perception (ESP) and psychokinesis (PK), respectively. They have done so because they believe that these terms are more naturally descriptive of the observables and are neutral in that they do not imply mechanisms. The »anomaly« in AMP refers to the insufficient understanding of the phenomenon, rather than the validity of experi-

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<sup>18</sup> N. L. Zingrone, and C. S. Alvarado, »A Brief History of Psi Research,« in E. C. May, and S. B. Marwaha (eds.), *Extrasensory Perception: Support, Skepticism, and Science, Volume I – History, Controversy, and Research*, Santa Barbara, CA: Praeger, 2015a, pp. 35–80.

<sup>19</sup> Star Gate Program: The U.S. government funded a 20-year, \$ 20 million anomalous mental phenomena program, best known by its last code name Star Gate, spanning from 1972 through 1995, at SRI International and Science Applications International Corporation, California (USA). The primary objective of the Star Gate program was to investigate the phenomenon of remote viewing (RV) as an aid in gathering intelligence during the Cold War, to assess the Soviet threat to the United States in general, and in their use of RV and to conduct basic and applied research to improve RV as an intelligence asset. At its peak, it had 12 full-time scientists on its roll. The principal investigators were Dr. Harold E. Puthoff (1972–1985), Russell Targ (1972–1982), and Dr. Edwin C. May (1976–1995). The formerly classified program was declassified in 2000.

<sup>20</sup> E. C. May, S. J. P. Spottiswoode, and C. L. James, »Managing the Target-Pool Bandwidth: Possible Noise Reduction for Anomalous Cognition,« *Journal of Parapsychology*, Vol. 58, No. 3, 1994a, pp. 303–313.

<sup>21</sup> Anomalous cognition (AC) is defined as the perception and cognition of information that emerges from a distant point in space-time, but which is blocked from the usual sensory systems by distance, shielding or time. In this process, some individuals are able to gain access to information from events outside the range of their senses by a currently not understood mechanism. Anomalous perturbation is defined as the interaction with matter solely by mental means alone (*ibid*).

mental data. Collectively, the AMP are also known as cognitive anomalies. The general term *psi* encompasses a wide range of phenomena of which AC and micro-AP/micro-PK, have been teased into the laboratory, while others such as macro-PK and survival research, are quite difficult to bring under controlled laboratory conditions. Psi research includes three classes of experiences:

1. Informational psi: Anomalous cognition (AC) or extrasensory perception (ESP), a.k.a. precognition/remote viewing, clairvoyance, and telepathy. Marwaha and May (2016)<sup>22</sup> have proposed that precognition may be the only form of psi phenomenon, as clairvoyance and telepathy can be subsumed within it, as it is impossible to close the precognition door; further, it collapses the problem space within which to search for a mechanism. Based on experimental data, they have defined precognition as an *atypical perceptual ability that allows the acquisition of non-inferential information arising from a future point in space-time* (Marwaha, and May 2015a)<sup>23</sup>.
2. Mind–Matter Problems: This refers to mental interaction with animate or inanimate matter. The research data for micro-psychokinesis<sup>24</sup> is weak with regard to its claimed effect size, but is, nonetheless, statistically robust. While there may be evidence for macro-psychokinesis<sup>25</sup> from field studies based on observational data, there is little *experimental* evidence to support it. Because of the crushing definitional problems of psychokinesis (i.e., negative or operational) and based on an analysis of the micro-psychokinesis data using the formulations of decision augmentation theory (DAT)<sup>26</sup> the evidence for psychokinesis is inconclusive.

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<sup>22</sup> S. B. Marwaha, and E. C. May, ›Precognition: The Only Form of Psi?‹ *Journal of Consciousness Studies*, Vol. 23, Nos. 3–4, 2016, pp. 76–100.

<sup>23</sup> S. B. Marwaha, and E. C. May, ›Rethinking Extrasensory Perception: Towards a Multiphasic Model of Precognition,‹ *SAGE Open*, Vol. January-March 2015, No. 1–17, 2015a (DOI: 10.1177/2158244015576056; last accessed on 11 January 2016).

<sup>24</sup> Micro-psychokinesis (micro-PK) is a form of anomalous perturbation that requires inferential statistics to observe an effect. Random number generators are considered examples of micro-PK.

<sup>25</sup> Macro-psychokinesis (macro-PK) is a form of anomalous perturbation that does not require inferential statistics to observe an effect. Bending rods of metal by mental means alone is an example.

<sup>26</sup> According to the Decision Augmentation Theory (DAT) AC information is in-

3. Survival Research: Reincarnation, near-death experiences, out-of-body experiences, and mediumship research. Post-mortem survival is based on the assumption that some aspect of the self (nonmaterial soul, consciousness) survives bodily death, retains autobiographical memory, can influence matter, and communicate with the living. However, according to the super-psi hypothesis, all evidence suggestive of survival is the result of the product of powerful sub-conscious psychic activity by living agents, mobilized and guided by deep-seated psychological needs. The super-psi theorist is obviously committed to the existence of informational psi. As this area is problematical with regard to evidence, there is an impasse between the super-psi and survival hypotheses because when they are compared in terms of their theoretical virtues neither has a decisive overall advantage (e.g., Braude 1992; Sudduth 2009)<sup>27</sup>.

The complexity of the psi problem underlying the experiential manifestations renders this a difficult problem to solve. Nevertheless, the evidence for psi is far-reaching, statistically validated, and worldwide. Although the field of psi research has received a skeptical onslaught along many dimensions including absence of scientific rigor, lack of evidence, inadequate statistical methods, and absence of causal mechanisms, Mark Leary, professor of psychology and neuroscience at Duke University, contradicting skeptics, has stated:

[...] my reading of the research literature suggests that parapsychologists are among the best experimentalists in science because they know that they must design more sophisticated, bias-proof studies than scientists in other fields in order to be believed. [...] As a result, their research designs are as tight, if not tighter, than those in more accepted areas, and they are often more critical of each others' work than is typical in science. They know that

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cluded along with the usual inputs that result in a final human decision that favors a »desired« outcome. In statistical parlance, DAT says that a slight, systematic bias is introduced into the decision process by AC (E. C. May, J. M. Utts, and S. J. P. Spottiswoode, »Decision Augmentation Theory: Toward a Model of Anomalous Mental Phenomena«, *Journal of Parapsychology*, Vol. 59, No. 3, 1995, pp. 195–220.

<sup>27</sup> S. E. Braude, »Survival or Super-Psi?« *Journal of Scientific Exploration*, Vol. 6, No. 2, 1992, pp. 127–144; M. Sudduth, »Super-Psi and the Survivalist Interpretation of Mediumship«, *Journal of Scientific Exploration*, Vol. 23, No. 2, 2009, pp. 167–193.

critics will question every aspect of their research designs and analyses and thus work extra hard to design convincing studies (2011: 276)<sup>28</sup>.

Recent publications such as *Advances in Parapsychological Research: Vol. 9* (Krippner, Rock, Beischel et al. 2013), *Anomalous Cognition: Remote Viewing Research and Theory* (May, and Marwaha 2014), *Evidence of Psi: Thirteen Empirical Research Reports* (Broderick, and Goertzel 2015), *Extrasensory Perception: Support, Skepticism, and Science, Volume I History, Controversy and Research, Volume II Theories of Psi* (May, and Marwaha 2015a, 2015b), *Parapsychology in the Twenty-First Century: Essays on the Future of Psychical Research* (Thalbourne, and Storm 2005), *Parapsychology: A Handbook for the 21<sup>st</sup> Century* (Cardeña, Palmer, and Marcusson-Clavertz 2015), *The Survival Hypothesis: Essays on Mediumship* (Rock 2014), provide the state-of-the-art in psi research.<sup>29</sup>

### *The Fundamental Problem of Informational Psi*

Psi research examines the subjective experience of acquiring information from a distant space-time point. The fascination with this aspect of human cognition focused early research on the experiencer and his experience. However, as researchers delved further into the problem, it became apparent that the picture was far larger than just human experience. The psi experience was a manifestation of far more fundamental questions; in its essence, it addresses the fundamental pro-

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<sup>28</sup> M. Leary, 'Why Are (Some) Scientists so Opposed to Parapsychology?' *Explore: The Journal of Science and Healing*, Vol. 7, No. 5, 2011, pp. 275–277.

<sup>29</sup> S. Krippner, A. J. Rock, J. Beischel, H. L. Friedman and C. L. Fracasso (eds.), *Advances in Parapsychological Research: Vol. 9*, Jefferson, NC: McFarland, 2013; E. C. May, and S. B. Marwaha (ed.), *Anomalous Cognition: Remote Viewing Research and Theory*, Jefferson, NC: McFarland, 2014; D. Broderick, and B. Goertzel, (eds.), *Evidence of Psi: Thirteen Empirical Research Reports*, Jefferson, NC: McFarland, 2015; E. C. May, and S. B. Marwaha (eds.), *Extrasensory Perception: Support, Skepticism, and Science*, Santa Barbara, CA: Praeger, [Vol. 1] 2015a [Vol. 2] 2015b; M. A. Thalbourne, and L. Storm (eds.), *Parapsychology in the Twenty-First Century: Essays on the Future of Psychical Research*, Jefferson, NC: McFarland, 2005; E. Cardeña, J. Palmer, and D. Marcusson-Clavertz (eds.), *Parapsychology: A Handbook for the 21<sup>st</sup> Century*, Jefferson, NC: McFarland, 2015; A. J. Rock (ed.), *The Survival Hypothesis: Essays on Mediumship*, Jefferson, NC: McFarland, 2014.

blems of the direction of time, causality, and information flow (May, and Marwaha 2015a: 3–8).<sup>30</sup>

Understanding time lies not just in the purview of physics alone. Precognition, itself, challenges the notion that time at the human level must move in one direction only. So it is both a psi research question as well as a physics one: How is it possible for non-inferential information from some point in the future to propagate backward in time to the present? Causality poses equally difficult challenges. We are all familiar with the concept that the pen I am holding above the desk cannot drop to the desk unless and until I have opened my fingers – causality at work. At first look, precognition appears to violate this concept. Yet, when Corry (2015)<sup>31</sup> examined the logical possibility of causality violation in ESP he found that there is nothing impossible about precognition.

The second law of thermodynamics reconciles this apparent conundrum of causality violation. That is, this law demands that entropy – a measure of disorder – can never decrease in a closed system. Suppose we take an ordered manuscript of 300 pages (low entropy) and toss them helter-skelter into the air. The pages land in a disordered mess. There are a huge number of ways in which the pages might land, but only one way in which they are in serial order. There are now a number of papers (May 1995, 2011, 2015; May, Spottiswoode, and James 1994b; May, Spottiswoode, and Faith 2000)<sup>32</sup> that show that the detection of informational psi is persistently correlated with the changes of entropy of the target system. Marwaha and May (2015a) take advantage of this finding to provide plausibility argu-

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<sup>30</sup> E. C. May, and S. B. Marwaha, »The Fundamentals of Psi,« in (2015a: 1–31).

<sup>31</sup> R. Corry, »ESP, Causation, and the Possibility of Precognition,« in May, and Marwaha (2015a: 107–127).

<sup>32</sup> E. C. May, »AC Technical Trials: Inspiration for the Target Entropy Concept,« *Proceedings of the 38th Annual Parapsychology Association*, 1995, pp. 193–211; E. C. May, »Toward a Classical Thermodynamic Model for Retro-cognition, in D. Sheehan (ed.), *Quantum Retrocausation: Theory and Experiment*, Melville, NY: American Institute of Physics, 2011, pp. 297–307; E. C. May, »Entropy and Precognition: The Physics Domain of the Multiphase Model of Precognition,« in May, and Marwaha (2015b: 125–144); E. C. May, S. J. P. Spottiswoode, and C. L. James, »Shannon Entropy: A Possible Intrinsic Target Property,« *Journal of Parapsychology*, Vol. 58, 1994b, 384–401; E. C. May, S. J. P. Spottiswoode, and L. V. Faith, »Correlation of the Gradient of Shannon Entropy and Anomalous Cognition: Toward an AC sensory system,« *Journal of Scientific Exploration*, Vol. 14, No. 1, 2000, pp. 53–72.

ments to answer the above mysterious question – how does information propagate backward in time.

### *Theoretical Approaches to Psi Phenomena*

There are several competing approaches to understanding the mechanism of psi, which include dualism, panpsychism, psychological, neuroscientific, and physicalist views, including those based upon a quantum metaphor, quantum mechanics (QM), or signal-detection. Details of these models can be found in May, and Marwaha (2015b).

The observables in informational psi phenomena are: (a) information originating at some distant space-time point and (b) the information eventually reported as some form of cognition. As stated, there is experimental evidence, both quantitative and qualitative, for the validity of informational psi (e.g., May 1988; May, Utts, Trask et al. 1989)<sup>33</sup>.

Dualist/panpsychist accounts of psi/siddhis, are based on first-person experiences and their analyses are embedded within the constructs of philosophical systems. While there are Western proponents of dualism and panpsychism in psi (e.g., John Beloff, Larry Dossey, Stephen Schwartz), this viewpoint is embedded in Indian philosophy. K. Ramakrishna Rao, former chairman of the Indian Council of Philosophical Research, is the leading proponent of this view from the Eastern perspective. This is well articulated in his comprehensive ›Trident (Triśūla) Model of Person,‹ based on Advaita and Yoga philosophy (Rao 2011, 2012)<sup>34</sup>. Limitations in space do not permit elaboration of this thesis.

Walker introduced the QM theory of psi, with particular reference to psychokinesis. According to Walker (1973)<sup>35</sup> »psi phenomena

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<sup>33</sup> E. C. May, *An Application Oriented Remote Viewing Experiment*. SRI Project 2740, Final Report Covering the Period 1 May 1987 to April 1988. Menlo Park, CA: SRI International, 1988; E. C. May, J. M. Utts, V. V. Trask, W. W. Luke, T. J. Frivold, and B. S. Humphrey, *Review of the Psychoenergetic Research Conducted at SRI International (1973–1988)*, SRI International Technical Report, March 1989, Menlo Park, CA: SRI International, 1989.

<sup>34</sup> K. R. Rao, ›Complementarity of Advaita Non-Dualism and Yoga Dualism in Indian Psychology,‹ *Journal of Consciousness Studies*, Vol. 19, Nos. 9–10, 2012, pp. 121–142.

<sup>35</sup> E. H. Walker, ›Application of the Quantum Theory of Consciousness to the Pro-

are attributed to quantum mechanical (QM) effects associated with observer-mediated state vector collapse.« Several criticisms have been put forth which have been reviewed by Walker (1984)<sup>36</sup>. The domain of applicability of QM is only to the micro-world. In the macro-world, including the brain, environmental decoherence, i. e. interference from the surrounding, is a persistent feature that argues against the role of QM in psi. Most recently, Marwaha and May (2015b)<sup>37</sup> have argued against the probability of the role of consciousness in the universe and in particular with regard to entanglement and the role of humans in the collapse of the state vector to one of its allowed *eigenstates*.<sup>38</sup> Even if we assume that a state vector collapse has occurred due to the presence of consciousness, information from a correlation will still require a signal to interact with the brain/consciousness. Additionally, decision augmentation theory, as mentioned earlier, provides a plausible argument for the micro-psychokinesis data.

There are at least two compelling arguments in support of a signal-based model of informational psi. All of our known sensory systems respond to external signals from the environment. Electromagnetic photons strike the retina allowing us to see; compression wave phonemes strike the sensory systems in our ears allowing us to hear, and so on. So it is a parsimonious approach to assume that psi must also be based upon a signal. Additionally, our known sensory systems are gradient detectors; that is, they are more sensitive at sensing changes at their ›front ends‹ than they are at detecting steady states. For example, it is much easier to notice a faint blinking light than one that is not. Apparently psi is easier to detect when the entropy of target stimuli is changing than when it is not – just like the other sensory systems. Thus Marwaha and May (2015a, 2015c) proposed a signal-based process-oriented multiphasic model of precognition, wherein they formally divide the problem space into the physics and neuroscience domains: The physics domain (PD; information-centric

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blem of Psi Phenomena,« in W. G. Roll, R. L. Morris, and J. D. Morris (eds.), *Research in Parapsychology*, 1972, Metuchen, NJ: Scarecrow Press, 1973, pp. 51–53.

<sup>36</sup> E. H. Walker, ›A Review of Criticisms of the Quantum Mechanical Theory of Psi Phenomena,‹ *Journal of Parapsychology*, Vol. 48, No. 4, 1984, pp. 277–332.

<sup>37</sup> S. B. Marwaha, and E. C. May, ›A Refutation of the Dualist Perspective in Psi Research,‹ *Journal of Consciousness Studies*, Vol. 22, No. 5–6, 2015b, pp.70–95.

<sup>38</sup> A measurement of a quantum system with many possibilities can only end up in one of them, which is called an *eigenstate*.



perspective) deals exclusively with the external physical world, and putative retrocausal signals emerging from a distant space-time point. The neuroscience domain (ND; person-centric perspective) addresses the question of how putative retrocausal signals are perceived and processed by the brain leading to a subjective experience. In their view, the putative retrocausal signals come to the 'vicinity' of the percipient (a PD problem), like any other sensory signals, and the percipient may thus be acquiring information that is occurring locally, in real-time. Thus, precognition may be like any other sense, albeit an atypical one as it is not universal to the species, in that only about 1% of individuals may possess the ability, and it may require an idiosyncratic type of cortical structure and processing. This rethinking about the mechanism and process of psi merits discussion.

#### 4 Psi Research and Siddhis

In this section we examine siddhis from the perspective of psi research along the dimensions of training, personality, and meditation. While these areas are *independent* of theoretical perspectives, they influence theory building.

A succinct summary of what is well established about psi is as follows: (1) A general conclusion can be drawn that AC ability exists; there is both field and statistical evidence for it. (2) Approximately 1% of the general population possesses a natural remote viewing [AC] ability. (3) Experienced viewers are significantly better than the general population. (4) Laboratory and operational remote viewing show the greatest potential for practical applications. (5) AC ability does not degrade over time [with the caveat that mental and physical health status will influence performance as it does for any other task]. (6) There is no quantitative evidence to support a training hypothesis. (7) AC quality is independent of target distance and/or size. (8) Electromagnetic shielding is not effective against acquisition of information from a distant space-time point (May, Utts, Trask et al. 1989).

Telepathy refers to the anomalous acquisition of information concerning the thoughts, feelings or activity of another conscious being. Procedurally, it is difficult to determine exactly what the target is, as one has to either rely on a pre-recorded note of the target stimulus (a clairvoyant condition) or rely on a post-session narration of

the target stimulus (a precognition condition). Related siddhis include those that give extraordinary knowledge, including the awareness of thoughts in others' minds (YS III.16–20), and the ability to enter one's thoughts into the body of another person (YS III.38).

Clairvoyance generally refers to information received from a distance, beyond the reach of the ordinary senses. It refers to the AC of objects and events as distinguished from AC of thoughts and mental states of individuals. Procedurally it means that the target stimuli in experiments are occurring in real-time, and are randomly generated *before* data collection is initiated. Related siddhis include knowing distant, hidden and subtle objects (YS III.25).

Precognition is an atypical perceptual ability that allows the acquisition of non-inferential information arising from a future point in space-time; that is, not enough time has passed between their occurrences for there to exist a causal relationship. In practical laboratory terms, it requires that target stimuli are randomly generated *after* responses are collected and secured. Related siddhis include supernormal hearing, feeling, sight, taste and smell (III.36), and intuitive awareness (III.25, 33).

### *Training*

That psi may be an innate ability, is reflected in YS IV.1, »The Siddhis are the result of birth, drugs, Mantras, austerities or Samadhi« (Taimni 1961: 322). However, the point that psi can be developed by training has not been established in the research literature. According to the YS (III), it is only after years of intensive yoga practice, including a disciplined life style, and becoming adept in *saṃyama* (*dhāraṇā*, *dhyāna*, *saṃādhi*) that siddhis begin to »happen.«

Research so far has shown that training participants with no inherent psi-ability has no effect on their psi performance (May, Utts, Trask, et al. 1989: 2). At best, you can train persons with psi abilities in the techniques of responding on psi tests rather than on developing the skill from scratch. For e. g., you need to have an inherent musical ability to be able to train to use a musical instrument.

Researchers typically use a protocol that involves a pre- post-training, effort and control design to determine the effect of yoga training on psi ability. A 6–8 week training program of about 2–4 hours/week of yoga practice, usually with a student population, is

planned for such studies. It is hypothesized, that at the end of this trial period, some psi abilities may be observed or there may be an enhancement in the ability as determined in a pre-training baseline. This is quite contrary to the Yoga theory, according to which siddhis begin to occur only after years (or even lifetimes) of arduous and sustained practice of yoga and mastering *sam̐yama*.

Roney-Dougal, and Solfvin (2006)<sup>39</sup>, examined the meditation–psi connection with long-term Buddhist meditation practitioners, and found non-significant relation between meditation and psi. In a later study (2008)<sup>40</sup>, they found a significant relation between meditation and performance on psi task. While these are preliminary studies, one can speculate that probably, the participants of the two studies had different innate psi abilities, which are on a continuum from no ability to highly proficient. Even with a participant population of advanced meditators (usually advanced in age also) it may not be possible to determine whether the ability was *inherent* or a *consequence* of meditation.

Contrary to the Yoga hypothesis, we find that our well-calibrated participants in psi studies (over 30 years' experience) at our laboratory, have never been practitioners of yoga, or even aware of its larger philosophy. They do use their own methods of calming down to assist in the process of focusing on the task at hand, but they are not intense as meditative practices. Moreover, research trials are sometime conducted in noisy environments, without having an effect on the robustness of the data obtained. Braud (2008: 226) suggests, the »chief applicability [of yoga practices] to psi inquiry is that these practises might help practitioners become generally less distracted and calmer in body and mind, and this increased quietude, accompanied by a more inwardly-directed focus of attention, might facilitate access to more subtle, internal carriers of psychically-sourced information.« Thus, experimental work using yoga to *develop* psi ability does not appear to be a valid approach; using persons with innate psi

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<sup>39</sup> S. M. Roney-Dougal, and J. Solfvin, »Yogic Attainment in Relation to Awareness of Precognitive Targets,« *Journal of Parapsychology*, Vol. 70, No. 1, 2006, pp. 91–120.

<sup>40</sup> S. M. Roney-Dougal, and J. Solfvin, »Exploring the Relationship Between Two Tibetan Meditation Techniques, the Stroop Effect and Precognition,« *Proceedings of the 51st Annual Convention of the Parapsychological Association*, Winchester, Britain, 2008, pp. 187–203.

ability is a valid approach, for both evidential and process-oriented research.

### *Personality*

Based in Sāṃkhya-Yoga theory, the three *guṇas*<sup>41</sup> – *sattva*, *rajas*, and *tamas* – are the inherent qualities of *prakṛti* (primordial matter), and are thought to be the building blocks of nature. While this is essentially a metaphysical concept, Indian psychology has adopted the *guṇa* construct as a personality theory. In the context of this discussion, we refer to this application of the *guṇa* concept.

According to Braud (1981)<sup>42</sup>, the relevance of *guṇas* to psi is that systems that are characterized by an excess of inertial constraints (*tamas*) or by overdriveness or overactivity constraints (*rajas*) are less susceptible to psi interactions than are systems characterized by more balanced (similar to *sattva*) modes of functioning. Based on a review of empirical studies, Sitamma (2005: 271–272)<sup>43</sup> reports that:

[...] studies reveal that *sattva* correlates significantly and positively with introversion and self-actualization; and negatively with extraversion and neuroticism. *Rajas* correlates significantly and positively with extraversion, and negatively with self-actualization. *Tamas* correlates significantly and positively with neuroticism, psychoticism, and self-actualization. [...] In the studies that related the *guṇas* to ESP only *tamas* was found to be significantly and negatively correlated to ESP.

As stated, according to the YS (III.37), it is by only following the practice of *saṃyama* that siddhis begin to happen. At this stage, the practitioner has a preponderance of the *sattva guṇa*. Transposing this idea on to the personality–*guṇa* combine, it can be stated that the *sattvic* personality, with the characteristic of introversion comes into

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<sup>41</sup> *Guṇas* – Attribute; property, quality, or characteristic arising from nature (*prakṛti*) itself; as a rule, when »*guṇa*« is used, it is in reference to the three fundamental qualities, »strands« or interacting components of *prakṛti*, the primordial materiality of the universe: *sattva* – purity, light, information content, *rajas* – activity, passion, and *tamas* – dullness, inertia, and ignorance (Rao 2011: 789).

<sup>42</sup> W. G. Braud, »Lability and Inertia in Psychic Functioning,« in B. Shapin, and L. Coly (eds.), *Concepts and Theories of Parapsychology*, New York: Parapsychology Foundation, 1981, pp. 1–36.

<sup>43</sup> M. Sitamma, »Trigunas: A Review of Empirical Studies,« in Rao, and Marwaha (2005: 271–272).

play. This is an appropriate analysis based on the state of the practitioner at this stage of meditation.

Personality has been one of the most widely studied aspects in psi research for understanding the process and to serve as a psi predictive factor. Extraversion–introversion was one of the most widely explored dimensions of personality in relation to ESP. A meta-analysis of 60 independent studies carried out by Honorton, Ferrari and Bem (1998)<sup>44</sup> showed that extraverted participants tend to obtain higher ESP scores than introverted participants. Extraversion has not been predictive of psi ability and its apparent correlation with psi appears to be an artifact of the data collection procedure; introversion appears not to play a role in psi performance. Based on this data, one needs to reexamine the sattvic personality–siddhis ability relationship.

Hartmann (1991)<sup>45</sup> proposed the concept of boundary »thinness« versus »thickness« as a dimension of personality. In the broadest sense, Hartmann’s concept refers to the boundary between any two processes in the mind, e. g., thoughts, feelings, and perceptions. Boundary »thinness« refers to the connection, overlap, and blending between these different mental processes. In the opposite end of the continuum, boundary thickness refers to the extent to which these processes are separated, demarcated, and distant from one another (Sand, and Levine 1996)<sup>46</sup>.

According to Hartmann, Harrison, and Zborowski (2001)<sup>47</sup> there is a correlation between thin boundaries and a belief in or tendency to experience paranormal phenomena. Groups of people who characterize themselves as shamans or psychics have been found to score thin on the Boundary Questionnaire (Krippner, Wickramasekera, et al., 1998)<sup>48</sup>. As Hartmann et al. state, if thin versus thick boundaries re-

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<sup>44</sup> C. Honorton, D. C. Ferrari, and D. J. Bem, »Extraversion and ESP Performance: A Meta-Analysis and a New Confirmation,« *Journal of Parapsychology*, Vol. 62, 1998, pp. 255–276.

<sup>45</sup> E. Hartmann, *Boundaries in the Mind*, New York: Basic Books, 1991.

<sup>46</sup> S. Sand, and R. Levin, »Concordance between Hartmann’s Boundary Questionnaire and the Eysenck Personality Inventory,« *Perceptual and Motor Skills*, Vol. 82, No. 1, 1996, pp. 192–194.

<sup>47</sup> E. Hartmann, R. Harrison, and M. Zborowski, »Boundaries in the Mind: Past Research and Future Directions,« *North American Journal of Psychology*, Vol. 3, No. 3, 2001, pp. 347–368.

<sup>48</sup> S. Krippner, I. Wickramasekera, J. Wickramasekera, and C. Winstead, »The Ramtha

presents a clear-cut personality dimension and also an aspect of mental state functioning, one would predict that thick versus thin boundary functioning should be detectable on the biological level, in terms of brain function and activity. In simple terms, one might suggest that thin boundaries, relative to thick boundaries, might be associated with more hyperconnectivity. Simmonds-Moore (2010)<sup>49</sup> has previously argued that synesthesia, often defined as the »merging of the senses,« could reflect one type of boundary thinness, which may fundamentally underpin a variety of anomalous experiences. This is supported by Parra (2015)<sup>50</sup> in his study of out-of-body experiences, where he finds that people who scored thinner boundaries also tended to score higher on spirituality, emotional impact, transliminality, and anomalous experiences. These ideas are supportive of Hypothesis 2.1 of the model of precognition, which states that cortical hyperassociative mechanisms may underlie psi experiences (Marwaha, and May 2015a).

### *Meditation*

Recent neuroscientific studies on meditation may shed some light on the yoga–psi question. Newberg (2014: 1)<sup>51</sup> states »A neuroscientific study of spiritual practices and experiences has the potential to provide fascinating data to further our understanding of the relationship between the brain and such phenomena.«

Using magnetic resonance imaging to compare age-related gray matter (GM) decline in yogins and controls, Villemure, Čeko, Cotton, and Bushnell (2015: 10)<sup>52</sup> report that regular practice of yoga may

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Phenomenon: Psychological, Phenomenological, and Geomagnetic Data,« *Journal of the American Society for Psychical Research*, Vol. 92, 1998, pp.1–24.

<sup>49</sup> C. A. Simmonds-Moore, »Personality Variables in Spontaneous Psi Research: Contextualizing the Boundary Construct in its Relationship to Spontaneous Psi Phenomena,« in C. A. Roe, W. Kramer, and L. Coly (eds.), *Proceedings of an International Conference Utrecht II: Charting the Future of Parapsychology*, New York: Parapsychology Foundation, 2010.

<sup>50</sup> A. Parra »On the Edge of the Anomalous Experience: Out of Body Experiences, Transliminality and »Thin« Boundaries,« *International Journal of Neurology Research*, Vol. 1, No. 1, 2015, pp. 8–13.

<sup>51</sup> A. B. Newberg, »The Neuroscientific Study of Spiritual Practices,« *Frontiers in Psychology* (DOI: 10.3389/fpsyg.2014.00215; last accessed on 11 January 2016).

<sup>52</sup> C. Villemure, M. Čeko, V. A. Cotton, and M. C. Bushnell, »Neuroprotective Effects of Yoga Practice: Age-, Experience-, and Frequency-Dependent Plasticity,« *Frontiers of*

have neuroprotective effects against whole brain age-related GM decline. Their results suggest that yoga practice is associated with larger brain volume in areas involved in bodily representation, attention, self-relevant processing, visualization, and stress regulation, providing a neural basis for some of the beneficial effects of yoga. These experience-related changes were located in the left hemisphere suggesting that increasing years of yoga practice progressively tunes the brain toward a parasympathetically driven mode and positive affective states. They further state that their study involved ordinary North Americans, and as such, if the observed structural brain variances are indeed related to yoga training, they should be within the reach of the average person and not reserved to a select few. Luders, Kurth et al. (2012)<sup>53</sup> and Lazar, Kerr, Wasserman et al. (2005)<sup>54</sup> report that meditators showed larger gyrification (the pattern and degree of cortical folding on the surface of the brain) in some of the areas where prior analyses revealed thicker gray matter cortices in meditators as compared to nonmeditators. Following their extensive analysis of the neurological correlates of various types of meditation practices, Mehrmann and Karmacharya (2015)<sup>55</sup> advise caution, because »[...] the neurological correlates of specific [meditation] practices differ significantly between populations, such as the differences one may find between monks, lay persons, adults, children, and individuals with psychopathology.« This brings to fore the question whether the cortical changes were indeed due to the practice, or they were already preexistent.

As the research data indicate, psi is an inherent ability, rather than a learnt ability. This supports the view that »siddhis are the result of birth« (YS IV.1). However, the role of training, drugs, man-

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*Human Neuroscience*, Vol. 9, No. 281, 2015, p.10 (DOI: 10.3389/fnhum.2015.00281; last accessed on 11 January 2016).

<sup>53</sup> E. Luders, F. Kurth, E. A. Mayer, A. W. Toga, K. L. Narr, and C. Gaser, »The Unique Brain Anatomy of Meditation Practitioners: Alterations in Cortical Gyrification,« *Frontiers in Human Neuroscience*, Vol. 34, Article 6, 34, 2012 (DOI: 10.3389/fnhum.2012.00034; last accessed on 11 January 2016).

<sup>54</sup> S. W. Lazar, C. E. Kerr, R. Wasserman, et al., »Meditation Experience is Associated with Increased Cortical Thickness,« *Neuroreport*, Vol. 16, 1983–1987, 2005.

<sup>55</sup> C. Mehrmann, and R. Karmacharya, »Principles and Neurobiological Correlates of Concentrative, Diffuse, and Insight Meditation,« *Harvard Review of Psychiatry*, Vol. 2, No. 4, 2013, pp. 205–218.

tras, austerities or *samādhi* in the development of siddhis has not been experimentally validated.

## 5 Concluding Comments

In this article we have examined some aspects of the hypotheses put forth by the dualist Sāṃkhya-Yoga school, based primarily in first-person experiences, alongside experimental evidence from psi research.

This line of analysis may be unacceptable to many. As Taimni (1961: vii) states:

[...] this [Yoga] Science of sciences is too comprehensive in its nature and too profound in its doctrines to be fitted into the framework of any particular philosophy, ancient or modern. It stands in its own right as a Science based upon the eternal laws of the higher life and does not require the support of any science or philosophical system to uphold its claims. Its truths are based on the experiences and experiments of an unbroken line of mystics, occultists, saints and sages who have realized and borne witness to them throughout the ages.

However, determining the validity of constructs is an essential step in the process and progress of *any* science.

According to Sāṃkhya-Yoga, non-material consciousness plays an instrumental role in the formation of our experiences. However, this hypothesis is unable to determine how a non-material consciousness can interact with matter – our brain and external objects. Marwaha and May (2015b) have argued against the possibility of a non-material consciousness based on (1) the physics principle that if there is any interaction at all, by definition, the cross section for that interaction must be non-zero, which demands that some part of consciousness must be material and (2) while there are clear quantum phenomena happening in the brain (e.g., single ion transport systems) the brain does not act as a collective quantum system. It is unlikely that single ions or atoms contribute to any aspect of large-scale phenomena such as personality or consciousness. These arguments suggest that a non-material consciousness cannot interact with matter (brain) to create subjective experiences.



The issues raised in this article require us to reconsider the hypotheses put forth by the dualist schools. As Marwaha and May (2015a) indicate, psi may be an atypical perceptual ability based on the perception of retrocausal signals emerging from a future point on space-time, but occurring in the »now« of the percipient. These signals are hypothesized to be perceived by an atypical transducer, and processed by a hyperassociative mechanism in the brain, with cognitions occurring in the same manner as do signals to other sensory systems.

Unless hypotheses of the physics and neuroscience domains are ruled off the table, it becomes difficult to state that psi is a purely non-local non-sensory experience emerging from a non-material consciousness interacting with the brain.

The weight of evidence for psi/siddhis is tilting towards the brain. As Gulyás, Bíró, et al. (2015: 8)<sup>56</sup> report, »that the brain contains almost fully its navigation skeleton appears as a mathematically clear and conclusive evidence that the spatial organization of the brain is nearly optimal for communication and information transfer, corroborating existing work on the subject.«

Legitimate questions asked of any theory include: What are the definitions of the core constructs? In what domain is the theory valid? For example, is the theory valid in the microscopic or macroscopic world? What are the questions that the theory addresses in understanding a phenomenon? Can the hypotheses put forth by the theory be verified? What does the theory predict? Questions such as these must also be asked of any dualist/panpsychist model, whether classical or contemporary, that addresses aspects of human experience.

The fundamental problem of psi – how does information get from there/then to here/now – rests in the information-centric physics domain, for which the neuroscience domain can provide clues. The fundamental questions that the experience of precognition raises – the nature of time, causality, and information – can be explored from the philosophical perspective, to which Indian philosophy can contribute substantially. Precognition data adds a dimension to the perennial free-will–determinism debate. While the experience of psi

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<sup>56</sup> A. Gulyás, et al., »Navigable Networks as Nash Equilibria of Navigation Games,« *Nature Communications*, Vol. 6, No. 7651, 2015 (DOI: 10.1038/ncomms8651; last accessed on 11 January 2016).

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may be understood in the neuroscience domain, the final theatre of explaining psi rests in the physics domain.<sup>57</sup>

—*Sonali Bhatt Marwaha, Visakhapatnam, India, Associate, Laboratories for Fundamental Research, Palo Alto, California, USA*

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<sup>57</sup> The recent theoretical advances in psi research cited in this work are based on the consolidation of research findings from the 20 year (1974–1995) \$ 20 m U.S. government sponsored research in remote viewing (precognition/anomalous cognition) and psychokinesis, best known by its last code name Star Gate, and thereafter the continuation of the program at the Laboratories for Fundamental Research (LFR). I gratefully acknowledge Dr. Edwin C. May, program director Star Gate (1985–1995), and President and founder of the LFR for commenting on this article. My deep appreciation to Prof. Charles T. Tart for his valuable comments in steering me to a more judicious approach in writing this paper.