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Contents

FEATURES

5 The Many Facets of the Placebo Effect

Most of us think of a fake pill or treatment when we hear the word placebo. Perhaps a better way to think about the placebo effect is to call it a "meaning" effect. The article explores this fascinating subject.

By Dr. David Kiefer and Dr. Bruce Barrett



8 Everyone is Psychosomatic

Disease affects life, attitudes and even values. Medical knowledge and technology has transferred the control of disease from the patient to the doctor. An illness can result in transient or permanent transformations for the individual.

By Dr. Lazslo Antonio Ávila

11 Biopsychosocial Model of Irritable Bowel Syndrome

Have you ever considered how your thoughts, feelings, memories, and your environment can influence GI functioning? Read more about this intriguing connection.

By Dr. Madhusudan Grover and Dr. Douglas A. Drossman



14 Coincidence Studies

We all experience what may be referred to as weird coincidences. At times you may be thinking of someone and then they call. This new field of research investigates this most interesting topic.

By Dr. Bernard D. Beitman



17 Dream and Emotion Regulation

Neuroimaging technologies have enabled a more comprehensive understanding of the mechanisms of dreaming. Dreams in part help us to regulate emotions.

By Catherine Duclos, MSc candidate and Dr. Martin Desseilles



ALSO IN THIS ISSUE

4 Editors Message

20 A Neurobiological Basis for Empathy?: Lessons from Humans and Rodents

Empathy is a widely recognized human attribute whose neurobiology is only beginning to be explored.

By Dr. Jeff Sanders, Dr. Thomas W Meeks and Dr. Dilip V Jeste

23 Winning, Losing and Human Evolution

How differently we feel when we win or when we lose. There actually may be an evolutionary component to these reactions.

By Dr. Leon Sloman



26 Social networking on the Internet: From pastime to excess and addiction

The last decade has seen an exponential rise in the popularity of social networking sites. There is a growing concern regarding internet addictions. This article looks at various studies regarding this topic.

By Daria J. Kuss (Doctoral Researcher) and Dr. Mark D. Griffiths



29 Willpower Depletion and Its Effects on Work Outcome

Every day, people resist the impulse to eat junk food, to say inappropriate things, etc. But did you know that self control requires energy.

By Dr. Alessandro Bucciol, Dr. Daniel Houser and Dr. Marco Piovesan



Editor's Message



The brain and mind remain a mystery to us. The last decade has shed much light on this topic but we are still in search of more evidenced-based data. The brain is a perplexing organ, as are the very questions of life, healing, consciousness, sleep,

and much more. This issue of Mental Notes addresses the fascinating topics of the brain/body connection.

Our relationship to the world around us influences us whether in our dreams, happenstance or through technology. Dr. Beitman (pg. 14) explores a new field of research referred to as coincidence studies. His article reviews topics such as serendipity, synchronicity, seriality and simulpathity (a term he coined). We all dream but have you ever considered the role of dreaming? Many people analyze their dreams or try to find meaning in their dreams. Catherine Duclos and Dr. Desseilles (pg. 17) discuss this topic in relationship to emotional regulation. Most individuals today use the internet and particularly social networking sites. How one's use can move from a leisurely pastime to excess and addiction is reviewed by Daria Kuss and Dr. Griffiths (pg. 26).

We all get sick at one time or another. What precipitates healing and what interferes with it? Scientists are now realizing

that the mind/brain/body connection is very complex. Health and mental health are closely linked; one absolutely affects the other. The mind is very powerful and events either from the past or from the present can affect our overall well-being.

We have all heard of the placebo effect. It is often referenced in clinical trials as to how useful a drug or procedure is. Dr. Kiefer and Dr. Barrett (pg. 5) address the meaning of the placebo effect and how to capitalize on the mind-body alliance. We often do not realize the impact of an illness or a disease on an individual altering their attitudes, emotions, self-concept, and values. Dr. Avila (pg. 8) explains how healthcare practitioners and family members ought to consider the patients' personal experience and psychology in relationship to their overall condition. To further the investigation of personal experience we can see how our history, thoughts, feelings and memories are interwoven with physical symptoms. Dr. Grover and Dr. Drossman (pg. 11) eloquently illustrate this in their article on the biopsychosocial model of irritable bowel syndrome. Currently many individuals in our society suffer from IBS and this article is very helpful in understanding the complexity of gastrointestinal disorders.

It is always a pleasure to bring these intriguing aspects of research to our readers. We are very grateful to our authors for providing helpful and interesting information.

Warmest Regards,
Rose Marie Donovan,
Editor-In-Chief



Summer 2012

mental NOTES
RESEARCH KNOWLEDGE HEALTH WELLNESS

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Mental Notes is published four times a year. Theories of the mind and its functions are numerous. Throughout history the question of behaviour, the mind, morality, and the brain have fascinated great thinkers and philosophers such as Plato and Aristotle. The topic still continues to be of significant interest to scientists and researchers from various disciplines such as psychology, sociology, neuroscience, psychiatry, and medicine.

The WHO states there is no health without mental health. Our goal is to disseminate information on a wide variety of subjects principally written by researchers. Knowledge effects change. We hope the information provided leads to greater health and well-being.

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Creative Artist	Mike Tam

Mental Notes is sponsored by those who have a keen interest in keeping individuals mentally healthy. Information on advertising is available from:

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Mental Notes is published by Prime Publications Inc., 85 Trowbridge Street West, Meaford, ON., N4L 1G4 Tel: 519-538-1418, Fax: 519-538-4017, www.primepublications.ca, info@primepublications.ca Subscription Information is available from jeaton@primepublications.ca

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Cover Description: Brain cells are organized into groups or networks that signal or communicate to one another. Altering the building blocks of these networks affects the flow of information through them. We thought that the cover image creatively and stylistically demonstrates this.



Volume 6 Number 3 ISSN 1913-9640
Publications Mail Agreement
#42088513

Printed in Canada



The Many Facets of the Placebo Effect

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“Placebo” usually refers to a substance (pill, potion, procedure) having no pharmacological effect

When we hear “placebo effect,” most of us think about a “fake” pill or treatment, one that has no physiological effect and to which the “real” treatment is meant to be compared. Decades of research and hundreds of research articles later, nuances are surfacing about what the placebo effect actually is, how it works, and how it can be harnessed to foster health and well-being. This article, a summary of a recent publication on the topic,¹ will review salient points about this fascinating topic, highlighting key references and possible clinical interventions.

The historical roots for thinking about placebos shed some light on discrepancies with more current research results. Although the Latin root means “I shall please,” historical definitions of “placebo” usually referred to a substance (pill, potion, procedure) having no pharmacological effect.² Much of this way of thinking centers on what is known as Cartesian duality, the separation of mind and body described by Descartes hundreds of years ago. Essentially, if the mind and body are not intricately connected, it is easy to then surmise that a psychological state, either conscious or unconscious, would be unable to cause any appreciable physiological effect. Placebo as belief in a particular treatment (mind) would lead to no physiological (body) effects.

Recent data has almost overwhelmingly negated this mind-body separation in favor of a rich mixture of the two. Some whisperings of this connection were seen in the medical literature as early as the 1950s. Women with nausea and vomiting in pregnancy who were given ipecac, an emetic (an agent that induces vomiting), but told that it would relieve nausea, had less vomiting.³ Cardiac patients randomized to “ham surgery” (skin incision only) instead of the accepted mammary artery ligation displayed greater exercise tolerance and reduced angina pain and nitroglycerin use.⁴ Beecher’s 1955 article “The Powerful Placebo” reviewed 15 clinical trials with $n=1,082$ participants, and found that an average of 35% of patients had symptoms “satisfactorily relieved by placebo”.⁵

The variety of clinical trials since this initial work runs the gamut of medical conditions. Two of these, pain and depression, are well studied with work that



When we hear “placebo effect,” most of us think about a “fake” pill or treatment

illustrates some interesting mechanisms. For example, researchers have shown that the medication naloxone, which blocks opiate receptors, can also decrease the effectiveness of placebo pain pills, hinting at the fact that placebo treatments for pain may work in the same way as proven pharmaceuticals such as morphine.⁶ In depression research, experts have found that anywhere between 50-80% of the effect of anti-depressant medications is from expectancy and placebo effects.⁷

The placebo effect runs deeper than these clinical responses and their physiological underpinnings. For example, some initial work showed that physicians’ style and interaction with patients might, as common sense would suggest, affect patients’ outcomes.⁸ A doctor’s words, for better or worse, can make a significant difference in how people do in their health.⁹ Another amazing example of the deep levels of placebo actions are the studies showing that red or pink placebo pills, more often than not, cause people to feel stimulated, whereas blue pills led to sedation.¹⁰ Apparently, there is meaning to color that runs deep enough to evoke a physiological response. Or, the fact that medications labeled with a brand name can be more effective than when labeled as generic.¹¹ Finally, studies convincingly show that people who take pills as prescribed, whether placebo or pharmaceutical, live significantly longer than those who are less adherent to medical advice.¹²

One interpretation of these findings is that, in the



A doctor's words, for better or worse, can make a significant difference in how people do in their health

current biomedical system and culture, by ingesting a pill, a patient may feel taken care of, or nurtured, by their physician and the medical system. Another, perhaps not as contradictory as it might at first appear, would be that patients feel empowered or energized by actively participating in their care. Such belief-related effects extend beyond biomedicine into the realm of complementary, alternative, and integrative modalities such as herbal medicine or acupuncture. One recent trial among $n=262$ people with irritable bowel reported that acupuncture, "augmented by warmth, attention, and confidence," led to 62% "reporting adequate relief," compared to 44% with acupuncture alone, and 28% who got neither.¹³ Our own trial of $n=719$ people with new onset common cold found that those who believed in the herb echinacea had colds that were 2.6 days shorter and 26% less severe if they received pills, whether or not the pills actually contained echinacea.¹⁴ Overall, this alignment of conscious and subconscious aspects of healing and belief stem from the mind and the body both tipping the scales towards health.

The magnitude of the effects in these research trials is striking. Beecher reported a range of placebo responses in his work from 25-58% (average 35%).⁵ More recent work, including a meta-analysis of 202 trials representing 60 medical conditions, with placebo response rates ranging from 13% to 68%.¹⁵ Research on specific conditions such as pain, depression, nausea, asthma and smoking cessation suggest that the placebo effect may be as strong or stronger than demonstrated pharmacological effects, and hence should be taken into consideration by physicians, patients, and those interested in health care and health policy.

Essentially, the accumulated evidence of substantive psychological and physiological responses to "suggestion,"

as demonstrated in clinical trials, makes a compelling case for a new paradigm regarding placebos. Perhaps a better way to think about the placebo effect is to call it a "meaning" effect,¹⁶ that is, how people respond to a particular situation or intervention is a factor of expectations, understanding, and values, in addition to conditioned responses from cultural and societal factors. When people feel cared for and empowered, they will have a more pronounced health response and better health outcomes. In a clinical scenario, a more pronounced benefit to any intervention might occur if the health care provider speaks positively (yet truthfully) about the therapy, provides encouragement and education to empower the individual, helps the patient explore his or her health-related value system, creates ceremony and ritual to foster meaning for the person, and takes the time to learn about the individual's

Research on specific conditions such as pain, depression, nausea, asthma and smoking cessation suggest that the placebo effect may be as strong or stronger than demonstrated pharmacological effects





When people feel cared for and empowered,
they have a more pronounced health response

outlook, past experiences and belief system. As researchers and practicing family physicians, these are our suggestions on how to enhance healing effects based on meaning, capitalizing on mind-body coherence, and supporting the inherent ability of people to grow, heal and be healthy.

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Everyone is Psychosomatic

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The physician must interact not only with the 'fact' of the disease, but with the person



The evolution of medical knowledge and technology has transferred the control of the disease from the patient to the doctor

The Greek word 'soma' does not mean the 'body,' as is generally believed; it means the 'corpse.' So, when we consider a living person, it is always a body with a soul (psyche). A deeper comprehension of the meanings of diseases can be derived from a careful analysis of the links between the onset of the symptoms and relevant aspects of the life history of the individual. The biography, in a broad sense, encompassing the emotional, the intellectual and the physical histories, shows that an illness is never a purely 'objective' fact, affecting the person from outside, that is, it is never just only a biological accident.

A disease is lived as an illness, full of experiences. It always represents many transient or permanent

transformations for the individual. A physical, or even a functional disease, affects life, changing attitudes and even values. So, the ill person is normally deeply concerned with all aspects of what he/she is suffering. The patient is interested in the origin, the course, the treatment, the complications, the consequences on the quality of life and the cure of his/her affliction and most of all, with the totality of the life, both mental and physical.

The evolution of medical knowledge and technology, principally over the last three centuries, has transferred the control of the disease from the patient to the doctor.

In spite of all available information on the Internet, the patient normally acts as a passive, subjected entity, open to the guidance of another person, the doctor. Then the



A disease can change a person

patient becomes a subject similar to an object.

Medicine has defined diseases as universal pathological entities, with a set of fixed characteristics that transcend history and society, because they are independent of where or when they occur. The epistemological orientation towards biochemistry, biophysics and statistics makes doctors perceive different diseases as minimal variations of the same pattern of traits, which, by themselves, are 'objective', that is, real and non-contingent. Departing from this definition and assumptions, doctors are not inclined to accept subjective conceptions of diseases as reported by patients or their relatives.

But, the disease lived as an illness impacts on the patient's beliefs, that is, on his representations, his will, his cognitions and feelings, his ideology, etc. The illness is a personal matter of uttermost importance. The patient's viewpoint interferes in what the disease 'is' because the disease, when lived by a person, becomes 'his' or 'hers.' The patient's perspective in relation to the origin, cause, development and/or solution of his/her symptoms may have no scientific basis. Nevertheless, the individual has rights, the right to be taken into account. Physical pain may be considered the

most tragic fact. A simple diet can be considered a total punishment. A medication can be seen as a 'demoniac' danger, leading the patient to interfere with its prescription. Crossed-eyes can be total destruction of the self-esteem of a woman. A small biologically irrelevant mutilation, such as the loss of the fingertip, may represent the difference between happiness and depression. So, the subjectivity of the patient is always awake in the process of illness, and cannot be erased from his/her encounter with doctors.

The man or woman who suffers is struck by the disease in his/her heart, and this is

not only metaphoric. A disease can change a person, and severe diseases change more extensively. This is why the ill person needs much more than simply to be attended using the most modern, precise and sophisticated techniques, the patient needs to be understood.

The relationship between a person and a disease has to be mediated by another individual. The physician must interact not only with the 'fact' of the disease, but with the person, the suffering and demanding person. At this

Doctors must be aware of the meanings lived by patients while they are suffering their diseases





The subjectivity of the patient is always awake in the process of illness

time, frequently, a psychotherapist is needed. Medical training, in general, does not provide doctors with an adequate arsenal to deal with the emotional impact of diseases. A very good psychodynamic background is necessary to face the meanings of the disease to the sick. The basic psychological meanings of disease are: death, limitations, fear, anguish and impotence. Emotional distress is not a boring 'side-effect'; it is a real and often the principal part of the problem. Even a slight disease is a danger and can thus represent a fearful experience. But experiences are not shown on x-rays or tomographies. Experiences must be shared. The apparatus needed for this is a deep interaction with another person, a companion through the whole psychophysical experience.

We believe, based on the psychosomatic approach, that a disease is a lived illness: a personal experience. Far from denying the biological basis of any disease, we think that the sick cannot be cut off from himself when he goes to the doctor. The soul cannot wait hanging in the closet, while the body is consulted by the only subject present in the scene: the physician.

What we find in any disease is the cry of the patient: not merely his/her physical suffering, but the pain of being excluded from participating from the doctor-'patient' quest for health. A person demands consideration. This is mainly the personal acknowledgement that the individual is in command

of himself and praises this capacity as one of the most precious components of his personality.

Doctors must be aware of the meanings lived by patients while they are suffering their diseases. Life and disease intertwine in a delicate mosaic within the solid tissues of new realities. Symptoms and feelings, pain and meaning, disability and family consequences, all of these are brought together, and the subject is the author; not patient of the complex dealing of his/her suffering. Viruses and traffic accidents are external events. But to get ill, and especially when the illness becomes a very

important part of life, is conjointly decided by nature and by the person with a complication of this being the presence of unconscious drives. This is the reason that a psychological investigation may be as necessary as the biological examinations doctors are 'obliged' to perform. An interdisciplinary approach is needed. The psychosomatist can investigate the links between life and pathology, personal history and onset of symptoms, chronicity and unconscious desires, fears or expectations and aggravations or improvements of symptoms. Simply put, the connections between sickness and subjectivity are meaningful ones.

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Biopsychosocial Model of Irritable Bowel Syndrome

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Biological, psychological, and social factors play a role in human functioning in the context of disease or illness

Irritable bowel syndrome (IBS) is a common gastrointestinal (GI) disorder characterized by recurrent abdominal pain or discomfort associated with disturbed bowel function (diarrhea or constipation).

This disorder belongs to a broader category of functional GI disorders characterized by abdominal discomfort or disturbances in motility but in which no obvious structural abnormalities are seen on endoscopy or X-ray¹. In spite of being present in up-to 20% of individuals in the community, IBS is not readily understood by both patients and physicians, often leading to sub-optimal management. The last decade of research has shown that IBS symptoms result from disordered functioning of the muscles and nerves of the GI tract and its connections with the central nervous system (brain and spinal cord). The biopsychosocial (BPS) model of IBS proposes that biological, psychological (which entails thoughts, emotions, and behaviors), and social factors all play a significant role in human functioning in the context of disease or illness². Early life factors (e.g., genetic predisposition, early learning, familial and cultural milieu) can influence the individual's later psychosocial environment, organ functioning, and eventually disease expression. The disease can then itself cause reciprocal effects on the brain. The product of this brain-gut interaction will affect symptom experience and behavior, and ultimately the clinical outcome.

Early Life, Culture and Family: An individual's genetic risk factors and its interactions with environment during early life affect later behaviors and susceptibility to illness. For example, childhood sexual and physical abuse can result in later development of IBS³. Early and excessive family attention toward GI symptoms can influence later symptom reporting and health care seeking. Familial



An individual's genetic risk factors and its interactions with environment during early life affect later behaviors and susceptibility to illness

social and cultural belief systems also modify how a patient experiences illness and interacts with the health care system.

Psychosocial Environment: As the child moves into adulthood, unresolved life stress such as the loss of a parent, an abortion, a major, personal, catastrophic event or their anniversaries, or daily life stresses including having a chronic illness, may influence the individual's illness in several ways: 1) to produce physiological effects, i.e., changes in motility, blood flow/secretion or sensation, thereby exacerbating symptoms, 2) to increase self vigilance toward symptoms, and 3) to lead to maladaptive coping, greater illness behaviors and health care seeking. Along with life stress (e.g., abuse), other psychosocial factors can also influence GI physiology and susceptibility to developing a pathological condition.

The most common psychiatric diagnoses seen among patients with IBS are depression and anxiety⁴. Even for healthy individuals, having an illness can cause psychological distresses, which are often transient and modifiable symptoms of anxiety, depression and other mood disturbances. Psychological distress also lowers



The most common psychiatric diagnoses seen among patients with IBS are depression and anxiety

pain threshold and increases health care seeking. When comparing IBS patients seeking health care with those who did not, the former report greater psychological difficulties, but also may deny a role for these difficulties in their illness. This alexithymia (from the Greek: “absence of words for emotions”, describes patients who have chronic difficulties recognizing and verbalizing emotions) develops in response to early traumatic experiences such as abuse, severe childhood illness or deprivation.

Coping and Social Support: A maladaptive emotional coping style “catastrophizing”, along with the perceived inability to decrease symptoms or loss of control over symptoms led to greater pain scores, more doctor visits, and poorer functioning. Catastrophizing is also associated with more difficult interpersonal relationships, predicts postoperative pain and contributes to greater worry and suffering in patients with IBS. Social support can have effects to reduce the impact of stressors on physical and mental illness, thereby improving one’s ability to cope with the illness.

The Brain-Gut Axis: This is a bidirectional and integrated system where thoughts, feelings, memories and environmental influences can lead to neurotransmitter release affecting various aspects of GI functioning. Conversely, altered functioning or disease of the GI system can reciprocally affect mental functioning. The effect of physical and psychological stress on GI function has been long known. In humans, fear, anger, anxiety, painful stimuli, and physical stress

are all associated with abnormalities in the motility of GI tract. Physical or psychological stress can also lower pain threshold particularly in IBS. In addition, it disrupts mucosal secretory and defense functions. Studies have shown that a subset of individuals suffering from acute infectious diarrhea will develop chronic diarrhea and pain which is also defined as post infectious IBS. Presence of psychological stress at the time of infection predicts later development of IBS.

Treatment Implications: It is important to obtain, organize and apply psychosocial information to achieve optimal care of patients with IBS. A sensitive and nonjudgmental physician-patient interview facilitates patient disclosure of psychosocial information. The patients’ understanding of their disease and illness should be elicited, especially any particular “fears” or “concerns” needs to be clarified or addressed. Subsequently,

The “absence of words for emotions” develops in response to early traumatic experiences such as abuse, severe childhood illness or deprivation





Fear, anger, anxiety, painful stimuli, and physical stress are all associated with abnormalities in the motility of GI tract

establishing a therapeutic doctor-patient relationship is the stepping stone to provide an effective treatment to patients with IBS. This is done when the physician: 1) elicits and validates the patient's beliefs, concerns and expectations, 2) offers empathy when needed, 3) clarifies patient misunderstandings, 4) provides education, and 5) negotiates with the patient the plan of treatment. At the same time boundaries should be set up and goals of treatment should be realistic and focus on "adapting" rather than complete "cure".

In addition to usual treatments that symptomatically treat diarrhea, constipation, or pain, psychological and behavioral treatments are also effective in the treatment of IBS particularly for patients with more moderate or severe symptoms⁵. These influence the dysregulation of

the brain-gut pathways and improve the clinical manifestations of pain and bowel dysfunction. Improvements in coping, global distress, and overall quality of life has been shown. The most commonly used psychotropic agents for the IBS are low doses of antidepressants such as Amitriptyline or Desipramine. Notably, the analgesic effect appears independent of the actions on mood disturbance, and it occurs before the improvement in psychological symptoms, indicating a separate mechanism of action over treatment of mood disturbance with these agents.

Behavioral treatments have advantages because of their safety, and ability to target factors contributing towards symptom perpetuation. These include modifying maladaptive illness beliefs (e.g., patients reporting: 'I can never get better', 'My symptoms will lead to cancer', etc.), behaviors (such as fear based avoidance and withdrawal from activities), symptom specific anxiety (specific fears about symptoms and activities associated with symptoms), and feelings of helplessness and lack of control. No one treatment is superior and the decision for a particular treatment is based upon the availability and skill of the therapist and the interests of the patient.

A referral to a behavioral therapist is advised. These behavioral treatments can be synergistic to medical treatments.

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Coincidence Studies

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Most people know
weird coincidences
commonly occur

Research studies at four American universities confirm what most people know: weird coincidences commonly occur (Beitman, 2011). The most common is “thinking of someone and that person calls on the telephone.” The most surprising of these telephone coincidences are those in which the receiver of the call has not thought of the other person for a long time.

One of our research participants told us this story:

“My abusive husband and I were separated. And while drunk he wrecked the car with the children in it. But I had decided to reunite with him. After he had visited his father, he expected me to pick him up at the airport. Waiting at home because his flight was delayed, I received an odd phone call. A woman had dialed my number by mistake. She began to tell me how her boyfriend was abusing her. The fear in the stranger’s voice made me understand that staying with my husband was a mistake. When I met him at the airport, I told him my thinking had changed and he could not live with me.”

Like this story, most meaningful coincidences have short time intervals between the mental event and the external event. Also there is usually no obvious cause for the connection between the two events.

Coincidences can be meaningful on two levels. On the personal level they can offer an opportunity to reconsider a decision as this phone call did. They can also confirm decisions, offer new ideas or warn us about what we might be thinking about doing. They can also be meaningful in a more general, transpersonal sense because they make us wonder about possible hidden causes.

Coincidence Forms

Carl Jung (1973) invented the word **synchronicity** from

the Greek **syn** (with or together) and **chronos** (time). Synchronicity means together-in-time. It served for Jung as an umbrella under which he grouped many weird events, including telepathy, precognition, and clairvoyance (collectively classed as psi). Other paranormal phenomena that Jung included under synchronicity were poltergeists, apparitions, divination (e.g. the I Ching), and astrology. Jung and those who followed him have maintained that synchronicity can be an important tool in the quest for self-realization, for personal and spiritual growth, and for a deeper experience of human interconnectedness.

Horace Walpole, a British Member of Parliament in the 18th century and inventor of the gothic novel, recognized in himself a talent for finding what he needed exactly when he needed it. He called this talent “serendipity” (a name he borrowed from an old tale entitled “The Travels and Adventures of Three Princes of Serendip”). Walpole used **serendipity** to mean finding something both by informed observation (sagacity, as he called it) **and** by accident. Today its meaning has expanded to include discoveries produced in a timely manner by

The most common coincidence is “thinking of someone
and that person calls on the telephone”

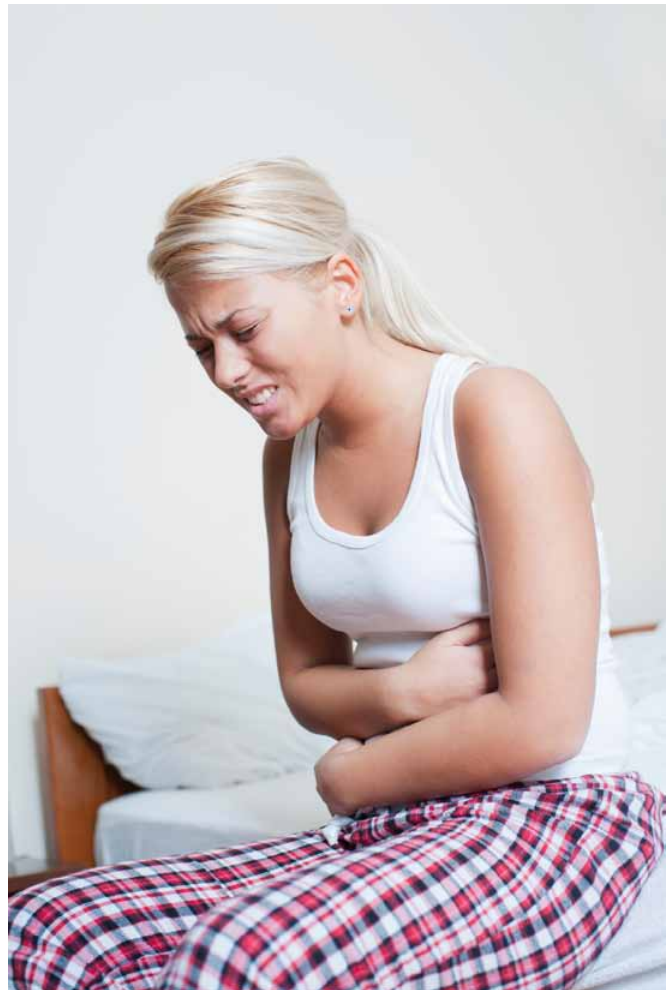


luck, chance, active searching, and informed observation. Jobs, romantic partners and important ideas are often discovered by serendipity.

Austrian biologist Paul Kammerer spent hours on park benches noting the people who passed by, classifying them by sex, age, dress, whether they carried umbrellas or parcels and invented the idea of **seriality**. Kammerer (1919) defined “seriality” as “a recurrence of the same or similar things or events in time and space” - events that, as far as can be ascertained, “are not connected by the same acting cause.” Unlike Jung he was not interested in personal meaning but rather in developing theories to explain these clusters of events.

I coined the term **simulpathity** to describe the mysterious, simultaneous experience by one person of another person's distress. The experience occurs generally without conscious awareness of the other person's distress and usually at a distance. One person is in pain and another person begins to feel the same pain

Jobs, romantic partners and important ideas
are often discovered by serendipity



One person is in pain and another person begins to
feel the same pain without knowing why. Often, the
two people share a strong emotional bond.

without knowing why. Often, the two people share a strong emotional bond.

Simulpathity means that both positive and negative emotion in relationships connects us to each other far more strongly than we currently believe. This implies that divorcing couples need to work much harder than may be recognized to reduce the intensity of their established but hidden bond.

Situations in which Coincidences are More Likely to Occur

The number of mind-context intersections and intensity of emotion each influence the frequency with which a person experiences weird coincidences. Mind-environment intersections can be increased by telecommunications, media immersion, unusual actions, and creative efforts. Emotional intensity is increased by births and deaths, marriage and divorce, severe



**Most meaningful coincidences have short time intervals between the
mental event and the external event**

sickness, moving, job changes, vacations and travel, psychotherapy, apparently unsolvable personal problems. Major transitions tear the web of our habitual patterns, increasing the possibility that something weird can enter our reality.

Theories

Jung and his followers have formulated the most elaborate theories. Jungian theories share in common the belief that the collective unconscious and archetypes are major participants in coincidence creation. Archetypes are thought to be activated (or constellated) in high-emotion situations. Jungians support their theories with ideas drawn from sources ranging from mythology to quantum physics and have provided a rich context from which to speculate about meaningful coincidences.

Divine intervention is a widely accepted explanation among the general public for meaningful coincidences. Among people who place high value on currently accepted causal concepts, coincidences are explainable in statistical and scientific terms like randomness, probability, and chance. Some people combine these

two predominant explanations by suggesting that “God works through random events.” Freudians meanwhile offer accounts of coincidence that evoke unconscious processes, current needs, and early childhood experience. Clearly, many of the theories today are in direct conflict with other theories.

Coincidence Analysis

The new field of Coincidence Studies will rely on both academic researchers and citizen scientists. We will need to develop sharper definitions of coincidence forms, clearer theories of their origins and principles for personal interpretation. The need for principles of personal interpretation will spawn coincidence analyzers to help individuals who experience confusing and complicated coincidences to make sense out of them.

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Dream and Emotion Regulation

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Think of the dream as a means
to evacuate an accumulated
emotional pressure and to
restore an emotional balance



The dream experience is highly emotional when compared to “real life,”
and is marked by negative emotions such as fear and anxiety

It happens to every one of us: to wake up feeling a range of emotions, from anger or suspicion to exuberance, and to have these emotions then impact the rest of our day. Why does it seem like a dream can affect our mood before we even step out of bed? Despite the clinical observations establishing a link between sleep and mood in various psychiatric and neurological disorders, the impact of dreams on the regulation of emotions has not yet been widely studied.

Sleep can be divided into two general states: rapid eye movement (REM) and non-rapid eye movement (NREM) sleep. REM sleep follows NREM sleep and arises regularly at the end of each 70 to 90-minute sleep cycle in the course of one night. As the night advances, periods of REM sleep become longer; while

NREM periods become shorter. REM sleep seems to be a neurophysiological state that facilitates dreaming, although dreams can occur in NREM sleep, most often as thought-like mentations, which take the form of thoughts or brief and unstructured combinations of disparate dream elements without a storyline, quite dissimilar to the vivid dreams encountered in REM sleep. Since dream reports are most vivid and elaborate after awakenings from REM sleep, current knowledge of cerebral functioning during dream derives mainly from studies of REM sleep.

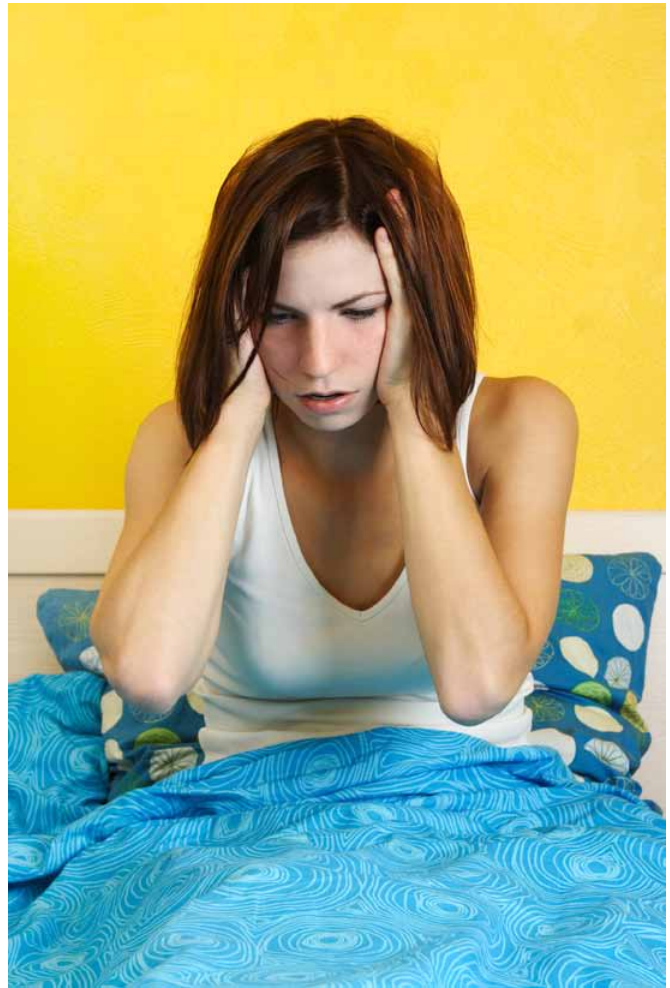
Dreaming is characterised by internally-generated sensory, cognitive and emotional experiences. The dream experience is highly emotional when compared to “real life,” and is generally marked by negative emotions such

as fear and anxiety. The emergence of neuroimaging technologies in the 1990s has enabled a more comprehensive understanding of the mechanisms of dreaming. REM (like NREM) sleep is marked by varying degrees of both sustained and transient activations of the brain. Early neuroimaging data showed an increased cerebral blood flow during REM sleep, especially to sensory and motor areas of the cortex, marking a high level of energy requirement. During REM sleep, the activation of the amygdala, which is known to respond to threatening or stressful stimuli during wake, reflects the increase in the intensity of dream emotions. The hippocampus, which processes emotional memories through its interactions with the amygdala, is also highly active during REM sleep.

Cognitive and sensory abnormalities in dreams, such as sensory distortions, misidentification of settings and characters, as well as contextual rearrangements and dissociations, spur mainly from the inactivity of the lateral and inferior prefrontal cortex (PFC). The PFC is important for superior cognitive functions during wake, such as reasoning, attention and executive functions (planning, organisation, problem solving, etc.). Its inactivity during REM sleep therefore explains why our dreams feel real when we're in them, as we uncritically accept bizarreness and the arbitrary restructuring of dream elements.

The medial prefrontal cortex (mPFC), the only part of the PFC that remains active during REM sleep, seems to play a role in the attribution of thoughts, intentions and emotions to oneself and to various characters and situations of the dream. Meanwhile, the inferior parietal regions, which usually contribute to creating a unified version of the self, are deactivated during REM sleep, enabling the dreamer to simultaneously experience his dream in the first- and third-person perspectives. This offline role-playing is suggested to facilitate the resolution of internal conflict, both social and emotional, which some assimilate to an emotional catharsis (Desseilles et al., 2011a, 2011b; Desseilles et al., 2012), or an emotional cleansing.

The psychological models of dreaming suggest that the dream is constructed from the emotional history of a person and serves in part to regulate emotions. Dreams are thought to have an adaptive function by simulating responses to threats, facilitating a more efficient response to such events in real life. A recent study suggests that REM sleep reduces the brain's reactivity to waking emotional experiences, simultaneously decreasing the intensity of previous affective experiences while diminishing subjective emotionality on the subsequent day. The suppression of noradrenergic neurotransmitters



Dreams and the negative emotions they often evoke seem essential to maintain psychological well-being in healthy individuals

(implicated in arousal and stress) during REM sleep, combined with the activation of the amygdala-hippocampal networks, would dissipate amygdala activity in response to previous emotional intensity and rewire the brain to reduce next-day emotionality (Van der Helm E. et al., 2011). In this perspective, we can think of the dream as a means to evacuate an accumulated emotional pressure and to restore an emotional balance, making lived (as opposed to dreamed) emotions feel less intense.

Various studies suggest that REM sleep is particularly involved in facilitating the regulation of emotional memory through the connections between the amygdala and the medial prefrontal cortex (mPFC). A dysfunction in the amygdala-mPFC network, causing an inability to regulate emotional activation during REM sleep, is suspected to be responsible for nightmare disorder (ND). People who suffer from ND frequently (at least



Attempting to suppress bad dreams in order to fend off negative emotions would not be always to our advantage

weekly) experience intensely disturbing dreams that involve fear, anger, anxiety, disgust, sadness, etc., which end in abrupt awakenings. Simor et al. (2012) hypothesized that the impaired functioning of the amygdala-mPFC network during REM sleep would be reflected during wakefulness through a lower performance on certain neuropsychological tasks. Subjects suffering from ND did in fact show greater difficulty carrying tasks requiring the control of emotional reactions, and exhibited a higher level of anxiety. We can then assume that the impaired communication between the activated structures of REM sleep inhibits the proper restoration of emotional balance.

As Dominic Cobb uses the dream to implant an idea in the 2010 film *Inception*, could we use our dreams for “emotional inception” or do our waking emotions have a stronger impact on our dreams than we can control? Since waking emotions influence dream content and dreams influence waking emotions, when and how can we really use dreaming to our advantage? One therapeutic strategy, “imagery rehearsal therapy,” uses dream imagery repetition during wakefulness to attenuate the influence of negative emotions in dreams and reduce nightmares. Lucid dreams are those in which the dreamer is aware of dreaming, and to a certain extent is able to modify dream content. The dreamer must start off in a state of mental relaxation, then move

through a hypnagogic state and create a dream scene, which he finally enters. Since lucid dreaming incorporates dissociated features of both REM sleep and wakefulness, can the lucid dream have the same effect on emotional regulation?

Dreams and the negative emotions they often evoke seem essential to maintain psychological well-being in healthy individuals. If dreaming is a necessary emotional catharsis, perhaps attempting to suppress bad dreams in order to fend off negative emotions would not be always to our advantage. More studies are needed to investigate the

influence of dreams on emotions and to understand the impact of dream induction, deprivation and manipulation on emotion regulation.

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A Neurobiological Basis for Empathy?; Lessons from Humans and Rodents

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Empathy is a widely recognized human attribute whose neurobiology is only beginning to be explored

On July 22, 2011, Anders Behring Breivik posed as a police officer and killed 77 strangers, including teenagers, in an apparently planned and cold blooded manner on the Norwegian island of Utøya. Subsequent psychiatric evaluation declared that Breivik was legally sane and was without psychotic symptoms during the attack. He demonstrated no remorse for his shocking actions. Though Breivik's actions appear to evade current psychiatric classifications (except that of antisocial personality disorder), his brutality reveals an obvious impairment in empathy. Defined as "the power of understanding and imaginatively entering into



The usual activation of the premotor cortex observed during the performance of piano playing also occurred while listening to a piano being played

another person's feelings"¹, empathy is an important psychological capacity and an interpersonal experience crucial for healthy social functioning; however, its underlying neural systems are poorly understood. Here, we briefly discuss human research on the neurobiology of empathy as well as evolving animal models. We have previously discussed putative neurobiology of wisdom, one of its components being empathy².

A prominent research theory proposes that empathic abilities in humans may be related to "mirror matching," which refers to patterns of brain activity similarly activated by one's subjective life events and by one's perception of these events as experienced or performed by others. Such mirror functions are thought to subserve our ability to feel others' emotions as if they were our own, providing an important basis for empathy.

Mirror matching has been shown to occur at the level of broad neuroanatomical regions, designated "mirror systems." For example, investigations in humans have found that the experience and observation of pain result in largely similar patterns of activity in the anterior cingulate cortex (ACC)³. Similar systems have been

found for feelings of disgust within the insula and frontal operculum as well as sensations of touch within the somatosensory cortex^{4,5}.

A number of questions exist with regard to the characterization of mirror systems and their role in empathy. For instance, to what extent is the mirror system development regulated by prior experience versus being innate? Many studies point to an important role for prior experience. A widely cited study found that the usual activation of the premotor cortex observed during the performance of piano playing also occurred while listening to a piano being played.

However, this premotor cortex activation while listening only occurred in those who had learned to play the piano⁶. In a separate study investigators compared motor cortex brain activity while watching a dance that one had learned to do versus that while watching a dance that one had not. These studies found greater brain activation during the observation of a dance that had been previously learned by the observer⁷. Taken together, these studies suggest that prior experiences may play an influential role in mirror system ontogeny.



Mirror matching provides a simple hypothesis for explaining aspects of social empathy

These observations are countered by other studies, however, showing an important role for innate factors in empathy and mirror system development. For example, patients with a congenital insensitivity to pain (CIP), have a profound decrease in lifetime pain sensation, allowing the study of how a lack of prior pain experience affects mirror system development for pain. Surprisingly, patients with CIP demonstrate a normal brain activity response to observing pain in others, revealing that a substantial portion of mirror system development for pain may, in fact, be innate⁸. Other studies of patients with CIP show that they also demonstrate a normal ability to infer pain from facial expression⁹. Collectively, these studies suggest that innate as well as experiential factors are important in the normal development of mirror systems and empathic abilities.

While innate versus experience-dependent contributions to mirror system development constitute one area of research, other studies endeavor to understand where, within the mirror systems, specificity for emotional recognition is subserved. Though mirror matching provides a simple and attractive hypothesis for explaining aspects of social empathy, widely differing emotions have been shown to activate similar brain regions. The amygdala, for instance, has been shown to exhibit similar activation to movies of happy, fearful, disgusted, and neutral facial expressions¹⁰. This calls into question how the brain appropriately recognizes and differentiates among the gamut of emotions other humans can exhibit and communicate. This lack of specificity in neural activation in response to others' emotional expressions calls for an added level of resolution, perhaps at the level of individual neurons embedded within these regions or at the level of interacting neuroanatomical areas¹¹.

Combined, these observations raise a spectrum of interesting questions that might further advance our understanding of empathy. Examples include: What genetic factors regulate the innate substructure of mirror systems and empathy? How does prior experience interact with these innate factors? Is it possible to provide a more detailed map of basic neurobiology subserving empathy, at the level of interacting neuroanatomical regions and possibly individual neurons? Uncovering answers to these questions will require not only continued human research but also novel animal models for studying the neural circuitry of empathy. Such models may allow us to investigate genetic factors contributing to empathy as well as its plasticity in response to prior learning. These animal models may also help elaborate further novel circuitries that are difficult to pursue in human research. Toward this goal, several rodent protocols have been developed to model human empathy. Although it is debatable whether these behaviors are true evidence of the human equivalent of empathy within rodents, they have been interpreted as representing an "emotional contagion", or primitive form of empathic responding. Emotional contagion can still occur among humans but entails a less sophisticated form of social connection, which seems to operate at a more implicit, unconscious level than the more intentional, cognitive processes involved in human empathy. For example, in an effort to model innate contributions to empathy-like behaviors, researchers have shown that the genetic background of rodents can modulate their empathy-like responses. Previous exposure to the fear of other mice facilitates the ability of C57BL/6J (B6) mice, a gregarious strain, to learn fearful associations, suggesting that mice receive information about the fear of other species

What genetic factors regulate empathy?





Studies show that rats demonstrate fear to the distress of other rats

members and incorporate it into their own fear learning. However, this is not seen in the less social BALB/cj (BALB) mouse strain¹². These studies point to important genetic contributions in the expression of empathic behavior that may be studied among various mouse strains. Other studies show that rats demonstrate fear to the distress of other rats; however, this is only when they themselves have learned a similar fearful experience¹³. Such an animal model may allow us to study the role of prior learning in facilitating empathy. Additional animal studies have detailed interactions among the ACC, medial amygdala, and thalamus that subserve social behaviors proposed to model empathy in humans¹⁴. These studies may allow us to begin understanding the complex interactions among brain systems involved in empathy.

In summary, empathy is a widely recognized human attribute whose neurobiology is only beginning to be explored. While investigations have uncovered several insights into the neurobiology subserving empathy, more questions than answers remain. One potential avenue of improved understanding may be through human studies that are supplemented by animal models. Though there are numerous challenges to understanding the neurobiology of empathy, in light of the actions of Breivik and countless other befuddling social tragedies, could the potential importance to public health of our continued research be any more vivid?

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Winning, Losing, and Human Evolution

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Natural selection led to the evolution of all species by promoting the survival of the fittest

When the home team scores a winning goal or touchdown in the final minutes of the game, the home crowd is jubilant. When the visitors score in the last few minutes, there is a stunned silence. Similar reactions to winning and losing are observed in other species such as the barnyard fowl. The self-confident demeanor of the alpha bird is applied to the human whose self-confident swagger is indicative of his being “cock of the walk.” In contrast, according to Schjelderup-Ebbe (1935), who also coined the term “pecking order,” if the alpha bird loses

“the fight and has to take refuge in flight, its behavior becomes entirely changed. Deeply depressed in spirits, humble, with drooping wings and head in the dust, it is – at any rate, directly upon being vanquished – overcome with paralysis, although one cannot detect any physical injury. The bird’s resistance now seems broken, and in some cases the effects of the psychological condition are so strong that that the bird sooner or later comes to grief”.

These reactions to winning and losing are so

widespread in humans and other species it would appear they must have had an evolutionary adaptive function in early man.

John Price (1967) threw light on this function, when drawing on observations of long-tailed macaques. He noted the similarity between depressed patients and animals, who lose in hierarchical encounters. He proposed that states of depression, anxiety, and irritability are the emotional concomitants of behaviors that are necessary for the maintenance of the dominance hierarchy in social groups. Price later proposed that the ideas of inferiority, unworthiness, withdrawal, loss of self-esteem and other characteristic features of depression were exquisitely designed to discourage the individual from continuing the competitive struggle, thus reducing the chances of injury or death. Other labels have been used for the reaction to defeat, but I call it the Involuntary Defeat Strategy (IDS). It is involuntary because it is automatic and it is a strategy because it is designed to fulfill its adaptive function.

Sturman & Sloman (2011) described the reaction to

winning and labeled it the Involuntary Winning Strategy (IWS). We may try hard to win or succeed to experience euphoria, but may also wish to avoid the pain associated with failure. The euphoria associated with winning also promotes a shift from an adversarial mindset to feelings of benevolence, which promotes reconciliation with the loser. Goodall (1988) observed “although a male chimpanzee is quick to threaten or attack a subordinate, he is usually equally quick to calm his victim with a touch, a pat on his back, an embrace of reassurance”.

Similarly, the loser’s IDS may lead to yielding and reconciliation. It is an interesting paradox that, while the IDS

A male chimpanzee is quick to threaten or attack a subordinate but he is usually equally quick to calm his victim with a touch, a pat on his back, or an embrace of reassurance





We may try hard to win or succeed to experience euphoria

and the IWS motivate competitors to try to win, when defeat seems inevitable to the loser, these same mechanisms contribute to ending the conflict and reconciling.

Adaptive And Maladaptive Cycles

Having a competitive advantage increases the likelihood of success. This increases self-confidence and enthusiasm, which generally leads to further success an example of success leading to success - the cycle of adaptation.

Success depends on the efficient functioning of psychophysiological mechanisms and also serves to promote the continued efficient functioning of these mechanisms. The IWS plays a pivotal role in promoting this efficient functioning and positive well-being; this state is directly related to health.

Different people's ability to handle failure and

losing varies. A lot also depends on the severity and frequency of the setbacks. Furthermore, if one puts up a good fight against an opponent much better than oneself, one may experience this as a success.

A player may quickly shrug off the discomfort of losing so that by the time he/she enters the dressing room he/she has regained their composure. On the other hand, when there is a long-lasting and powerful IDS, this manifests as clinical depression. In this case, persistent failure continues to trigger the IDS by generating mounting frustration and anger, which compels the individual to continue the agonistic encounter even though they recognize they

cannot win. This serves to further trigger the IDS leading to the maladaptive cycle associated with persistent failure and increasing incompetence.



Different people's ability to handle failure and losing varies



Depression, anxiety, and irritability are necessary for the maintenance of the dominance hierarchy in social groups

Difference Amplification

The adaptive cycle is associated with frequent success and the maladaptive cycle with persistent failure. If two individuals are engaged in agonistic competition, the winner experiences the adaptive cycle and, if the adversary continues to lose, he will experience the maladaptive cycle. Difference amplification refers to how adaptive and maladaptive cycles magnify the initial advantage that the winner enjoys and this sometimes manifests as diverging social status. Most of human evolution occurred in small hunter-gatherer groups, when the same two individuals were likely to compete over a considerable time. In early man, those who rose in the hierarchy by virtue of agonistic success had better access to desirable mates, food and territory.

Because of positive assortative mating, the winner chose mates that were better endowed which resulted in the winner's progeny having a better endowment than the progeny of the loser. Agonistic success would therefore have given the individual an immediate advantage in the struggle for survival and also given his genes a further advantage through his progeny (Sloman and Dunham, 2004).

Phylogenetic Adaptation

Charles Darwin's monumental contribution was to demonstrate how natural selection led to the

evolution of all species including humans by promoting the survival of the fittest. Greater fitness implied better adaptation to the particular environment and the increase in fitness over successive generations represented phylogenetic adaptation. By magnifying the advantage of those who were successful in agonistic competition, difference amplification gave those who were more successful an added advantage, which would have increased the rate of phylogenetic adaptation. Many scientists have wondered how humans could have evolved from *Homo erectus* to *Homo sapiens* in such a short time on the evolutionary scale - about 600,000 years. Difference amplification could provide at least a partial answer.

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Social Networking on the Internet: From pastime to excess and addiction

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The term “Facebook
addiction” appears all
over the media



Specific groups such as young adults and females appear to use SNSs regularly

The last decade has seen an exponential rise in the popularity of social networking sites (SNSs). Today, 80% of US Internet users dedicate 23% of their online time to social media, including social networking sites and weblogs (e.g., personal online diaries). Mobile use via smart phones is steadily increasing. One - third of SNS users access their site via their mobile phones and social networking is one of the most popular activities engaged in via these devices. Specific groups such as young adults and females appear to use SNSs regularly (The Nielsen Company, 2011). Moreover, social networking sites offer a variety of different activities for the users over and above socializing. Users can download and share photos and videos, use personal message and email functions, and engage in gambling and gaming. Online SNSs clearly

have many things to offer different people.

Given the worldwide appeal of SNSs across genders, age groups, and ethnicities, there appears a growing concern about potential excessive use. Case study evidence is accumulating among the media, treatment service providers, and the academic research community. The media report cases of teenagers who spend most of their time chatting to their friends on social networking sites. The term “**Facebook addiction**” appears all over the media - particularly on the Internet - and has led to the development of the first screening instrument, the ‘Facebook Addiction Scale’ (Andraessen, Tosheim, Brunberg & Pallesen, 2011). There are emerging stories about adolescents and young adults whose participation in real life is sacrificed for spending their



Today, 80% of US Internet users dedicate 23% of their online time to social media

time on **Facebook** and related sites. Rather than meeting their families and friends in real life, they tend to prefer socializing online.

However, the question is whether we can truly speak of an 'addiction' in relation to excessive SNS use. If we apply the word 'addiction,' it needs to be defined in the same way that is used in diagnostic manuals of mental disorders by the American Psychiatric Association and the World Health Organization. There are a number

of typical addiction criteria that need to be met in order for a person to be diagnosed with it (Griffiths, 2005). First, there is **mood modification**. This is where a person uses a particular substance or behavior in order to change or modify their emotional mood state. Here, social networking would be used to either make the person feel better (either to become aroused and/or to escape). Second, there is **salience**. Here, a person is totally preoccupied with using SNSs. Users keep thinking about past SNS use and anticipate future use in such a way that it slowly dominates their lives. Third,

tolerance develops. A person needs to spend more time on SNSs, posts more content (e.g., comments, pictures, and videos), and constantly updates their profile and status. This is done in order to experience the same pleasurable feelings that were experienced in the first place when the sites were used for shorter periods of time. Fourth, **withdrawal symptoms** occur. When a person is unable to engage in social networking because they do not have online access, they become irritable, moody and fearful. Their eating and sleeping behaviors change and they may feel depressed. Once they are able to start networking again, the

withdrawal symptoms stop. Fifth, **conflict** occurs. The excessive social networking use can lead to problems with partners, family members, friends, and colleagues (i.e., all relationships are compromised). Furthermore, they realize that they have a problem but feel they are unable to cut down and/or stop. They lose control over their networking behavior and it compromises their education and/or their occupational performance. Finally, once they quit social networking, they relapse.

Introverts use the SNSs to compensate for a lack of real life social contacts





Excessive engagement with social networking may be potentially addictive

More often than not, people who are addicted and who stop their excessive behavior, will find themselves in situations where they start again after periods of abstinence.

At present, the term "addiction" (or dependence) is only officially used in relation to substances (e.g., alcohol, nicotine, and other drugs). The only behavioral addiction that is currently psychiatrically recognized is pathological gambling. In the next version of the Diagnostic and Statistical Manual of Mental Disorders (due to be published in 2013), the diagnostic category of "substance dependence" will be subsumed under "addictions and related disorders." This new category will not only include substance-related addictions, but also behavioral addictions such as pathological gambling. This reclassification has the consequence of paving the way for other behavioral problems – including activities such as gaming addiction and social networking addiction – to be viewed as real addictions.

With this in mind, it appears that the excessive use of social networking sites such as **Facebook** could potentially be indicative of an addiction to a specific Internet application, namely social networking. In a more comprehensive work on the topic, we found a number of indicators of problematic use (see Kuss & Griffiths, 2011). These include particular personality traits, such as introversion, extraversion and narcissism. Introverts use the SNSs to compensate for a lack of real life social contacts, whereas extraverts use it to broaden their already extensive networks. Higher usage is associated with high narcissism and neuroticism and low conscientiousness. Therefore, people with these character traits may be particularly at risk for developing an addiction to using SNSs. In addition to this, studies

indicate that there are a number of negative consequences due to excessive use. These include a neglect of real-life social connections including the compromising of personal relationships, and a detrimental impact on academic and/or work performance. However, to date, there have been only three academically published studies (and a couple of unpublished theses) examining SNS addiction specifically from a scientific perspective. Overall, these studies found a number of factors associated with addiction: certain personality traits (outlined above), self-identification as a social networker, looking for a sense of belongingness on the SNS, the presence of a number of other psychological problems (including fear and sleeping disturbances, loneliness, boredom), being male, engaging in online social activities, and building online relationships.

In summary, social networking sites have emerged as important virtual spaces that offer its users a variety of different leisure time activities in which to engage.

Media reports and case study evidence indicate that for a small number of SNS users, the excessive engagement with social networking may be potentially addictive. To date, the evidence is far from conclusive when it comes to a diagnosis of SNS addiction. In order to provide a comprehensive picture of this potentially new mental health problem, future studies need to assess symptoms that are clinically relevant using the most rigorous scientific methods.

For more detailed information on these studies and our literature review, please contact us.

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Willpower Depletion and Its Effects on Work Outcome

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Our research is the first to study the connection between willpower, temptation and performance

Every day, people resist the impulse to eat junk food, to say inappropriate things, to cheat on their partner, etc. Self-control also forces individuals to follow rules and norms prescribed by society rather than undertaking a more selfish behavior. Behaving in an appropriate way requires energy that must then be subtracted from other domains. The same concept applies to the workplace: we sometimes find it difficult to concentrate on the boring task at hand, and thus are tempted to play instead of work. For instance, many businesses rely on the Internet, making Internet temptation a largely unavoidable part of today's workplace. In particular, social networking on Facebook or MySpace, shopping on Amazon or eBay, or spending time with personal email are only a mouse-click away for many office employees. A widely-cited survey conducted in 2005 by America Online and Salary.com ranked personal Internet use as the number one way people waste time at work (Salary.com, 2007.) Consequently, to encourage workers' productivity, offices often adopt policies monitoring Internet use during work hours. As a result, rather than succumbing to the Internet temptation, many employees will delay their gratification by waiting until their workday ends to use the Internet. Nonetheless, the above examples suggest that self-control is a deliberative, conscious and effortful action, and that using willpower to delay gratification can impact performance on subsequent tasks. Therefore, prohibiting or controlling employees' temptation can decrease their productivity, slow down reaction times, and increase errors and lapses in vigilance.

An extensive literature in psychology and economics demonstrates the importance of willpower to decision-making. Additionally, recent work in social psychology suggests that using willpower to resist temptations can negatively impact performance on subsequent tasks (Vohs and Heatherton, 2000). One explanation is that willpower creates costly self-control problems, thereby consuming an individual's energy. As energy is a limited resource, individuals putting energy into willpower will have little energy left. They therefore tend to become more passive in making decisions and completing tasks (see Muraven et al., 1998). Our research is the first to study the connection between willpower, temptation and performance. In particular our goal is to investigate



Behaving in an appropriate way requires energy that must then be subtracted from other domains

whether exposure to a prohibited tempting item reduces work productivity on a subsequent task.

In a first study (Buccioli et al., 2011a), we ran a field experiment on a sample of children. We focused on children (aged between 6 and 13) in order to take advantage of the well-established fact that the self-regulatory resources of younger children are more easily depleted than those of older children. In the experiment, the temptation was a table of snacks and drinks. We found that exposure to temptation only had a significantly detrimental impact on the productivity of younger children. This conclusion is compatible with the view that productivity falls when it is costly to exert self-control. We then wanted to see if this finding would hold true in a stylized environment more closely related



We sometimes find it difficult to concentrate on the boring task at hand, and are tempted to play

to a typical job situation.

In a second study (Buccioli et al., 2011b), we conducted a laboratory experiment in which subjects were required to perform 13 counting tasks. The tasks contained varying levels of difficulty but remained the same for all subjects. After the first three tasks, the subjects in the Willpower Treatment (WT) were asked to resist a temptation for 10 minutes, whereas subjects in the No Willpower Treatment (NWT) were not.

The temptation was the opportunity to join others in watching a humorous video instead of silently watching a blinking red button. Following the exposure to this temptation, all subjects were able to continue with their tasks. We measured productivity as the difference between the correct answer and the answer reported by the subject in each of the 13 tasks. We found that subjects who did not need to resist temptation made significantly fewer mistakes on a subsequent counting task. Thus, the key insight emerging from this research is that an important way to increase worker productivity is to design the workplace so that employees need to resist fewer temptations.

This finding has many practical implications. Perhaps most importantly, employers should not prohibit the Internet, but leave it available, as many actually do.

Indeed, this may be an especially ineffective approach toward increasing worker productivity. Instead, employers should either remove the Internet entirely

(going instead to an intranet-based system that is locked from the outside world) or, when doing so is impractical, allow employees a certain amount of time – perhaps even as often as several minutes per hour – for personal Internet activity. Such breaks could be creatively arranged (e.g., lunch breaks could be shortened in light of the “surf-time”) and viewed along the same vein as a “cigarette break,” a “coffee break,” or any short break that leaves the employee free to spend time in a way he/she prefers. Although such breaks were once common, they have become increasingly less so.

Studies of willpower are still in their early stages, and much remains to be discovered.

Future theoretical advances will more clearly identify the rate at which willpower is depleted, as well as whether this rate might systematically vary with observable characteristics of the decision maker (e.g., gender or age) or the environment in which a decision takes place. Empirical research, in addition to validating the hypotheses stemming from such economic theory, will also explore the neural foundations of temptation and self-control. Future work

on the biological (including of course genetic) bases of willpower promises wide clinical applications (e.g., to the treatment of compulsive gambling), as well as broad relevance to other fields like economics, psychology, public policy, philosophy and law.

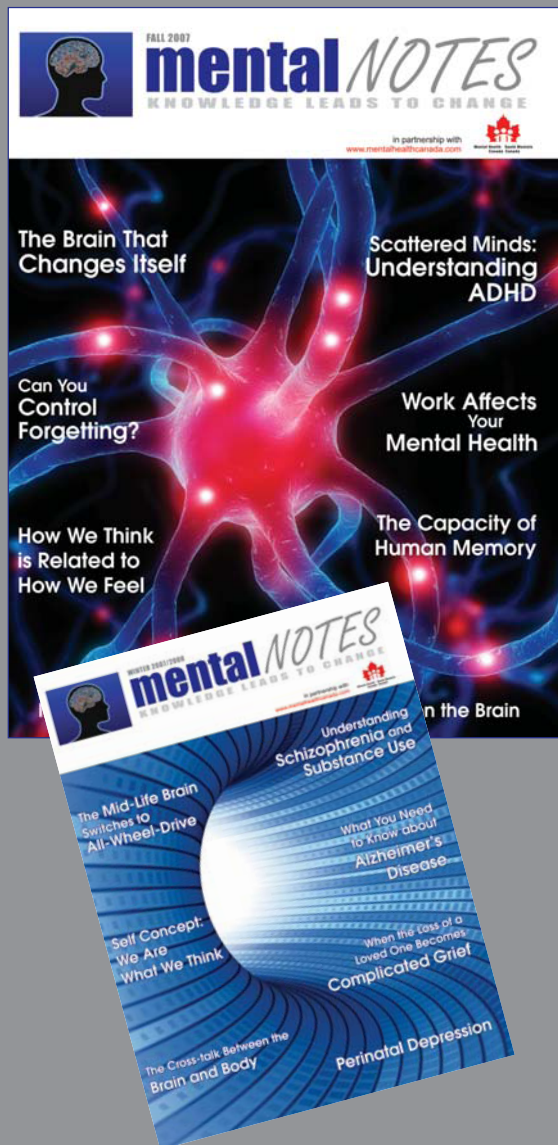
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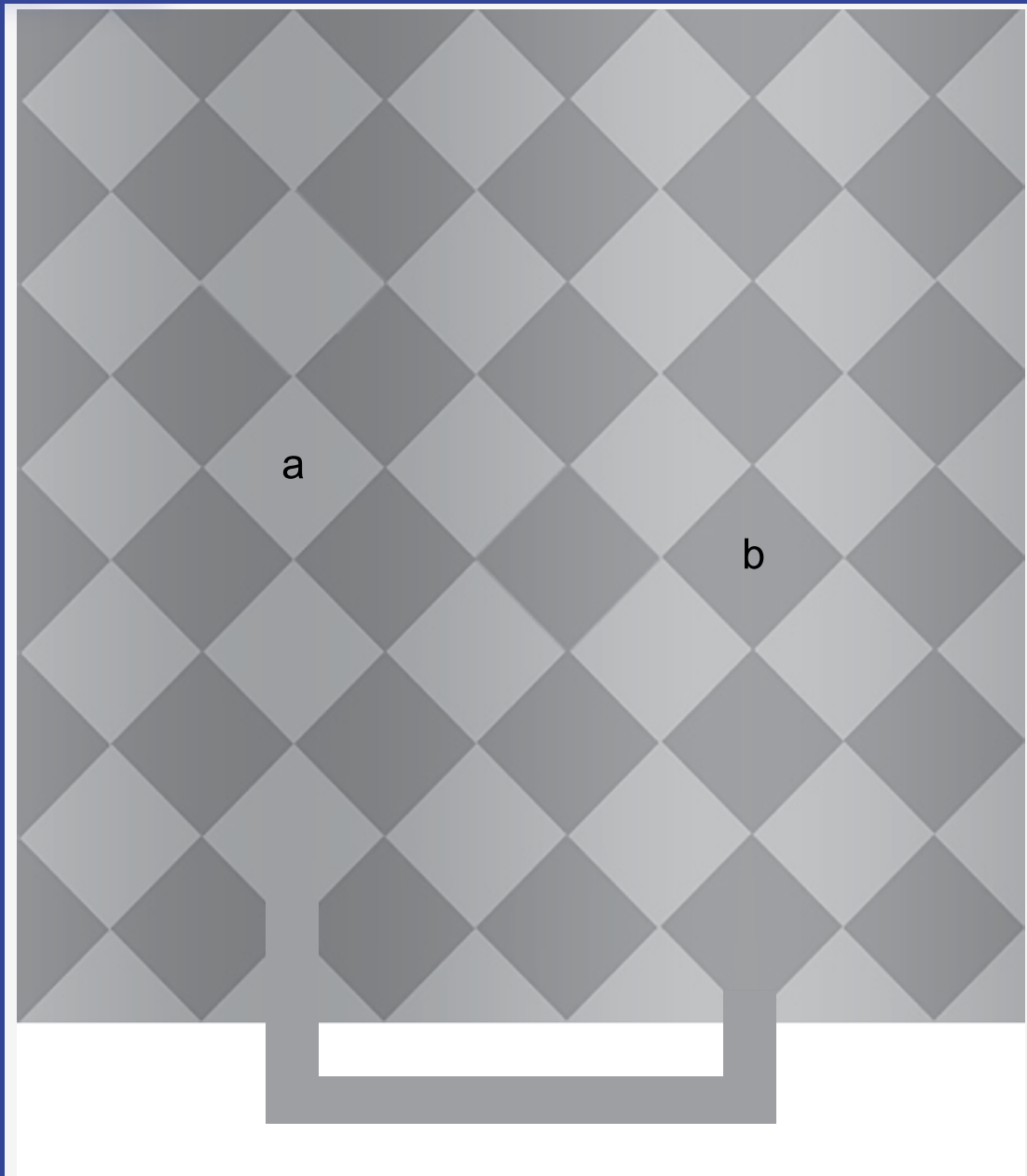
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Checkerboard shading illusion

The two diamonds a and b have the same luminance, or light intensity, yet look dramatically different in shade of grey (the diamonds in any vertical column all have the same luminance, so by following the connector between the diamonds at the bottom of the figure you can see that a and b are the same). The diamonds have the same luminance because a gradual luminance gradient has been added to the checkerboard, going from dark on the left to bright on the right. The result is that the addition of 'dark-part-of-gradient' plus 'light-diamond' on the left equals the addition of 'bright-part-of-gradient' plus 'dark-diamond' on the right. However the gradual luminance gradient is barely perceptible and our visual system treats it as illumination, specifically shading. We tend to discard shading when estimating the color of surfaces, so we see the two diamonds as if the gradual luminance gradient were not there, i.e. as very different shades of grey.



The illusion was designed by Professor Frederick Kingdom of the McGill Vision Research Unit, Department of Ophthalmology, McGill University. It is based on similar illusions designed by Professors Ted Adelson of the Massachusetts Institute of Technology and Alexander Logvinenko of Glasgow Caledonian University. Professor Kingdom has a longstanding interest in brightness illusions, as part of his on-going research on color vision funded by the Canadian Institute of Health Research.