Taking a Mental Vacation: A Problem-Solving Method using Metaphor in Creative Incubation Processes

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ABSTRACT: Mounting pressures on problem-solving teams require creative thinkers to take a "break," "downtime," or even a mental "vacation," in order to regroup before re-tackling the problem. Indeed, creative insight can arise during an unrelated train of thought in what is known as *incubation*. The greatest benefit of incubation is the 'aha' moment that it can produce, when the unconscious releases an idea that is relevant to the original goal of the task at hand. Several theories have been offered as to how incubation produces effective ideas, however, most refer to leaving the problem (at least in part) before returning to it. Further research on unconscious processes suggests that metaphor works in the unconscious, even while *conscious attention,* or the focused processing of different levels of perception, is directed elsewhere. This paper investigates how a facilitated group incubation process using metaphor to direct conscious attention might generate creative outcome. It then offers a basic *directed metaphorical processing method.* "Synectics," devised in the 1960's by marketing researchers, is given as an example for further investigation.

KEYWORDS: problem-solving, incubation, metaphor, conscious attention, synectics

Introduction

Creativity and problem-solving are inextricably linked; it can be said that any thought processes that are applied to problems which produce novel outcomes (related or unrelated) requires creativity (Ward 2012). *Creative problems* can be defined as problems that necessitate novel and original approaches (Gilhooly, Georgiou, Garrison, Reston & Sirota, 2012). One of the most well-established descriptions of the problem-solving process comes from Graham Wallas's *The Art of Thought* (1926), which originally included seven stages:

> *Encounter* (a problem or challenge is identified), *Preparation* (information is gathered), *Concentration* (an effort is made to solve the problem), *Incubation* (ideas churn in the person's head), *Illumination* (what seems to be a solution becomes apparent), *Verification* (the individual checks out the apparent solution), and *Persuasion* (the individual attempts to convince others that the product really does solve the problem) (Cropley & Cropley 2010, 309).

Wallas's process has been typically reduced to four stages: *preparation, incubation, illumination,* and *verification*, with the majority of references to it being the *incubation* and *illumination* stages. There are a multitude of problem-solving process descriptions that are either based on Wallas's stages, are derivatives of it, or are new theories of the process. A few are: Hadamard's (1945) four stage model, Osborn's (1963) six steps of *"finding"* (as described by Doak, Jambura, Knittel & Rule, 2013); Mumford and colleagues' eight individual core processes, and Runco and Chand's two-tiered model (Basadur, Gelade & Basdur 2014). More recently, Basadur, Gelade & Basdur (2014) have proposed creative problem-solving process *styles* that include finding problems before they start. Few of the many process descriptions available today focus on *incubation*, and seem to imply it rather than have it as an integral step.

The incubation stage has held fascination for decades, and empirical research shows that it contributes to creative thinking (Ritter & Dijksterhuis 2014). What remains compelling is how it works and benefits the creative process. The story of incubation goes like this: when one is troubled by a creative problem, setting it aside for a time may either lead to spontaneous novel ideation or a more rapid appearance of ideas once the original problem is re-approached; more so than if one keeps "the nose to the grindstone" without an incubation stage at all. Ritter & Dijksterhuis (2014) have reported that unconscious thought in incubation has shown to lead to more divergent ideas than conscious thought. They suggest that engaging in tasks that aren't taxing during incubation

contributes significantly to increased creative solutions. Physicist and philosopher Henri Poincaré describes his now famous personal experience with incubation:

> Just at this time I left Caen, where I was then living, to go on a geological excursion under the auspices of the school of mines. The changes of travel made me forget my mathematical work. Having reached Coutances, we entered an omnibus to go some place or other. At the moment when I put my root on the step the idea came to me, without anything in my former thoughts seeming to have paved the way for it, that the transformations I had used to define the Fuchsian functions were identical with those of non-Euclidean geometry. (Simon 1977)

Contemporary thought suggests that indeed there was something paving the way for his illumination, and that it is not so much directed processing taking place in the unconscious as previously thought, but rather more casual and unintended combinations of ideas and thought processes below the horizon of conscious awareness (Csikszentmihalyi 2014).

Unconscious Work

Gilhooly, Georgiou, Garrison, Reston & Sirota (2012) suggests three different theories (or groups of theories) of the incubation effect, and the roles of conscious or unconscious awareness (for the purposes of this paper, I'll refer to the unconscious and subconscious equally, to support the terminology of those referenced herein; see Simon 1977). The first, *intermittent conscious work*, allows for individuals to carry out conscious work directly related to the problem, but only intermittently throughout the incubation period. This process still stimulates unconscious processes while the target task is briefly attended to. The next theory, the *'fresh look,'* involves passively distracting the individual to help them forget the problem so that a fresh start can be applied after the incubation period is over. The *fresh look* uses *selective forgetting*, as described by Simon in *Models of Discovery* (1977). In selective forgetting, the individual starts out with a main goal along with sub-goals; during conscious work on a sub-goal unconscious data is picked up from the problem environment that adds to the main goal. The sub-goals, whether accomplished or not, can be selectively left (and then forgotten), and when the individual returns to the main goal they will approach it with different information available from the subconscious, so that when the task is resumed, new ideas are more readily able to come forth. Although some research suggests that a restive state allows mind wandering to enhance our creativity during incubation (Baird et al. 2012), selective forgetting allows the individual to work consciously on other tasks, and then when they leave them and forget about them, their minds will be more apt to make the creative connections they need to upon return to the problem.

The third theory is *unconscious work,* which involves active but unconscious processing of the original problem. Poincaré offers information which can be included in this approach: "this appearance of sudden illumination [is] a manifest sign of long, unconscious prior work… [This unconscious work] is possible, and of a certainty it is only fruitful, if it is on the one hand preceded and on the other hand followed by a period of conscious work" (Csikszentmihalyi 2014, 75). Gilhooly, Georgiou, Garrison, Reston & Sirota (2012), however, suggest otherwise, indicating that immediate incubation during the problem-solving process, just after the problem material has been ingested, is just as effective if not better than delayed incubation (where the individual(s) incubate only after a period of conscious work).

Either way, incubation is not an individual experience. Whether an individual experience's it when isolated from others, or whether a team of workers do it as a group activity, incubation has a social dimension, as argued by Csikszentmihalyi (2014). He suggests that the conscious and subconscious elements of incubation always have social influences. For example, an individual's creativity is affected in three ways: first, their personal experience; second, the *field*, or the social group / section of society whose prevailing thinking defines a body of practice (i.e., other employees with a similar practice, institutions, a 'society'); and third the *domain*, or the body of practices that are deemed separate from others (i.e., 'accounting' in an organization, or an area of interest like 'literature'). There are multiple levels of fields and domains, in and out of an

organization. This makes sense when an organization's team is working on a particular creative problem, that there are a multitude of influences on the incubation and thus illumination stages of the process.

Conscious Attention

Although research shows that focused deliberation, which is when an individual thinks in a concentrated and focused way on the problem task, undermines creativity (Baird et al., 2012), there is another more open attentional state that includes focus but has a multi-modality quality. *Conscious attention* can be defined as the processing of perceptual information available to cognition as a phenomenal experience (Montemayor & Haladjian 2015). It was found that during conscious attention, large-scale information is able to be integrated in various brain regions, suggesting an efficiency of information gathering and integration during all levels of perception (Bob et al. 2012). As a result, multiple sources of information are processed into a coherent percept, across modalities (Montemayor & Haladjian 2015), in 'global' manner. For example, when approaching an intersection on foot, auditory and visual information is processed coherently in order to know when to cross. Conscious attention takes up one level of awareness that is immediate to perception, but does not consume the entirety of the conscious/subconscious mind. Csikszentmihalyi (2014) suggests a three-level mental model during incubation that incorporates *conscious attention*. The first level of conscious attention remains open and perceptive; however, there are personal and social dimensions to whatever the individual invests with their attention. Heredity, motives, interests and values all play a part of what and why a person places their attention on something or someone (or both). The next level is *semiconscious filters*, which are processes that choose which information is to be considered relevant enough to pass into the subconscious. The third is *subconscious processing entities*, which allows multiple sources of information to be processed simultaneously, where many entities are interacting randomly and working collectively on many problems. Though the individual may only be able to process one idea at a time within conscious awareness, once ideas are working in the subconscious, they may be processed synchronously. This mental model shows us the complex nature of incubation, that while the conscious attention is working on one process, others may be working related to or even independent of what is being held by the conscious attention, as determined by what is filtered and what is not.

It has been shown that active unconscious processes in incubation contribute to creative output, and that unconscious thought may be active in finding remote associations (Ritter & Dijksterhuis 2014). Associative processes lead to *relationships of correlation*, such as analogy and metaphor (Gabora & Kaufman 2010). White (2011) suggests that unconscious thought is "cognitively organized through the medium of metaphor" (153), and suggests that metaphors help us in creatively structuring more complex meaning via unconscious processes. Lakoff & Johnson (1980) tell us that we automatically and unconsciously classify our experience through metaphor (82-83), and that the very concepts we live by are based on "how we in part structure our experience, consciously or unconsciously, by means of metaphor" (158).

Cognitive metaphor theory suggests that metaphors may have been planted in our minds since we were very young, suggesting an unconscious processing of our environment through them, enabling us to understand abstract ideas and concepts easier as a result (Marin, Reimann, Castaño 2013). Metaphors related to creativity also have been shown to increase creative outcome, possibly because they access earlier experiences of creativity, which can motivate an individual's creative intent (Marin, Reimann, Castaño 2013).

Metaphors can help psychologically abstract or 'distant' concepts seem closer and thus more personal through the use of psychologically concrete or 'near' concepts, which can allow individuals or groups to tackle problems in a much more effective and adaptive way (Jia & Smith 2013). This is helpful for creative problem solvers who are tackling large-scale problems such as climate change, when the necessary solutions seem distant in the far-off future.

Due to their associative nature, metaphors may be at work in our unconscious processes, even from the time of our youth, and since they are connected to creative output and helping understand abstract concepts, metaphors may be useful in the incubation stage to stimulate creativity.

A Metaphoric Vacation

When a group is working on a creative problem, incubation has shown benefit; however, a deliberate process during the incubation stage to generate novel ideas may be applied instead of idly waiting for the magical 'aha' moment to appear. A *selective forgetting* approach during a group's incubation period may help. The group starts with a main creative goal, but instead the group gives conscious attention to a sub-goal, and in doing so, allows their unconscious or subconscious processing of other integrated information to be picked up during the sub-goal and other incubation tasks. It is the dynamic multi-modality nature of the unconscious that can process associative thinking while keeping attentive to the sub-goal. Since metaphor works with the unconscious, not only relating embodied experience since childhood but also remote associations and abstract concepts to conscious thought, it allows the construction of creative meaning out of complex situations. Since unconscious data is acquired through the whole sub-goal process, at the end of the selective forgetting process, the main goal may be served.

I suggest that *directed metaphorical processing methods* during incubation may lead to creative illumination. For example, perhaps a group reaches a creative impasse, or perhaps at the very beginning of their creative session (as per Gilhooly, Georgiou, Garrison, Reston & Sirota 2012), the group decides instead of simply taking a break, to engage in a *metaphoric 'vacation;'* that is, a dedicated period of time away from the problem environment but focused on a process that uses metaphors to stimulate creativity. During this incubatory stage away from the main goal, instead of entering a restive state such as drinking coffee, the group engages in a facilitated process that is less strenuous and more enjoyable than the problem environment, but focused enough to directs conscious attention on a *metaphor problem* instead. The metaphor problem is associated to the original problem but less complex and different enough so the group may convincingly leave the main problem and work on different aspects of metaphoric representation to generate solutions to the new metaphor problem. The original problem is complex, thus why it is a "problem," however, a simpler metaphor problem to the original problem allows the group to engage in fun and creative wordplay, so that the group works with the metaphors to sort out different ways of looking at the problems that might be connected to it. Once the metaphor problem has been "worked out" to some degree sufficiently, variant possible solutions generated (although not necessary), and enough time has passed for the 'vacation,' the group forgets the metaphor problem and leaves incubation. They then readdress the original problem with a fresh look, using any appropriate associations from the metaphor problem to instigate novel concrete ideas out of the abstract ones. Such an incubation process would allow for associative subconscious entities to interact collectively on the problem(s), while conscious attention works on a relatable but distinct sub-goal so that unconscious data is picked up and added to the original goal. Of course, the domain, field, and social dimension of the group would add complexity to the internalization of metaphoric representation within each individual and group; however, the large-scale information processing as described by Bob et al. (2012), could allow for an efficiency of integration.

Prince (2012) has created a practical method that is similar to the above in *Synectics*. In collaboration with W. J. Gordon and others through years of studying organizational group dynamics, mostly through recording marketing teams in creative problem-solving processes, Prince writes about how the collaborators found the most constructive way of ideation was through the use of metaphor. They crafted an eight-stage method which incorporates multiple techniques that includes what's called an *excursion*, which is an incubation-like process for teams to become more creative and that is founded on metaphorical response. The synectics method originated in the early 1960s and has since been used with companies around the world; however most academic papers on the method are descriptive or anecdotal.

Conclusions

The incubation stage of creative problem-solving has fascinated the public and the research community for years, and several explanations have arisen as to how it works. However, although it can potentially facilitate the generation of creative output, there have been few proposals for how to best approach the potential for creative stage. Conscious attention has been shown to work in tandem with subconscious processing in incubation, and the active process of finding remote associations as a possible result. Metaphors appear to work in the unconscious and can be applied to abstract thought. A reasonable method, as a result, has been proposed as a *directed metaphorical processing method,* that uses metaphor as conscious attention during the incubation stage to have the problem-solving group work on a metaphor problem, drawing associations of abstract concepts to novel concrete ones about the original problem upon return. Synectics by Prince (2012) is such a method, and used as an example of what is proposed here. Though there is little empirical research on metaphorical incubation processes leading to creative output, and the apparent success of Synectics despite its documentation over decades still lacks peer-reviewed empirical study, still, this paper outlines an interesting proposal for the incubation process that has the potential to reveal practical application in elucidating how incubation effects might arrive through conscious attention processes, which deserves more research.

References

Baird, B., Smallwood, J., Mrazek, M. D., Kam, J. W. Y., Franklin, M. S. & Schooler, J. 2012. "Inspired by distraction: Min wandering facilitates creative incubation." *Psychological Sciences 23*(10): 1117-1122.

Basadur, M., Gelade, G. & Basdur, T. 2014. "Creative problem-solving process styles, cognitive work demands, and organizational adaptability." *The Journal of Applied Behavioral Science 50*(1): 80-115.

Bob, P., Zimmerman, E. M., Hamilton, E. A., Sheftel, J. G., Bajo, S. D., Raboch, J., Golla, M. & Konopka, L. M. 2012. "Conscious attention, meditation, and bilateral information transfer." *Clinical EFG and Neuroscience 44*(1): 39-43.

Cropley, D. & Cropley, A. 2010. "Functional creativity: 'Products' and the generation of effective novelty." In J. C. Kaufman & R. J. Sternberg (Eds.). *The Cambridge handbook of creativity* (301-320). New York, NY: Cambridge University Press.

Csikszentmihalyi, M. 2014. *The systems model of creativity: The collected works of Mihaly Csikszentmihalyi.* Dordrecht, Netherlands: Springer.

Doak, C. K., Jambura, S. M, Knittel, J. A. & Rule, A. C. 2013. "Analyzing the creative problem-solving process: Inventing a product from a given recyclable item." *Creative Education 4*(9): 592-604.

Gabora, L. & Kaufman, S. B. 2010. "Evolutionary approaches to creativity." In J. C. Kaufman & R. J. Sternberg (Eds.). *The Cambridge handbook of creativity* (279-300). New York, NY: Cambridge University Press.

Gilhooly, K. J., Georgiou, G. J., Garrison, J., Reston, J. D. & Sirota, M. 2012. "Don't wait to incubate: Immediate versus delayed incubation in divergent thinking." *Mem cogn*, 40: 966-975.

Hadamard, J. 1945. *An essay on the psychology of invention in the mathematical field.* New York, NY: Dover.

Jia, L. & Smith, E. R. 2013. "Distance makes the metaphor grow stronger: A psychological distance model of metaphor use." *Journal of Experimental Social Psychology 49:* 492-497.

Lakoff, G., & Johnson, M. 1980. *Metaphors we live by.* Chicago, IL: University of Chicago Press.

Marin, A., Reimann, M. & Castaño, R. 2014. "Metaphors and creativity: Direct, moderating, and mediating effects." *Journal of Consumer Psychology 24*(2): 290-297.

Montemayor, C. & Haladjian, H. H. 2015. *Consciousness, attention, and conscious attention.* Cambridge: The MIT Press.

Osborn, A. F. 1963. *Applied imagination: Principles and procedures of creative thinking* (3rd ed.). New York, NY: Charles Scribner's Sons.

Prince, G. M. 2012. *The practice of creativity: A manual for dynamic group problem-solving.* Williamsville, VT: Echopoint Books and Media.

Ritter, S. M. & Dijksterhuis, A. 2014. "Creativity – the unconscious foundations of the incubation period." *Frontiers in Human Neuroscience 8*(215): 1-10.

Runco, M. A., Hao, N., Liu, M., Ku, Y. & Hu, Y. 2015. "Verbal divergent thinking facilitated by a pleasurable incubation interval." *Psychology of Aesthetics, Creativity, and the Arts 9*(3): 286-295.

Simon, H. A. 1977. *Models of discovery and other topics in the methods of science.* Dordrecht, Holland: D. Reidel Publishing.

Wallas, G. 1926. *The art of thought.* New York, NY: Harcourt, Brace and Company.

Ward, T. B. 2012. "Problem solving." In M. Mumford (Ed.), *Handbook of organizational creativity* (169-215). London: Elsevier, Inc.

White, R. S. 2011. "The Nonverbal Unconscious: Collision and Collusion of Metaphor." *Psychoanalytic Inquiry 31*(2): 147-158.