

# **Inducing Creativity, Embraced by Mobility: The Critical Link between Creativity and Mobility in Group Collaboration**

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## **Abstract**

*This is a report regarding research-in-progress on mobility and creativity in small group collaboration settings whose aim is to better understand what synergistic or reciprocity effects are taking place between mobility and creativity. Mobility is perceived to play a role in a person's creativity when such a person is using mobile communication in a collaborative group setting. However, there is paucity of studies of such a situation. As a result, there is much to gain—both from the theoretical and practical perspectives—by conducting such a study. By controlling the level of mobility, a person's and a group's creativity levels can be examined. This in-progress report presents the study's motive, background, literature review, theoretical framework, experiment design, and expected contributions.*

## **Introduction**

There have been streams of studies and reports that clearly support the fact that mobile technologies are rapidly becoming one of the prime communication and exchange conduits in our society (TIA, 2017). Consequently, mobility offers many interesting tracks and issues to study across a number of disciplines. One such area is creativity. The focus of this study is the *critical link* between mobility (via mobile technologies) and creativity (both the individual and group level).

Mobility is leading attribute of today's many consumer digital products—a feature that seems to get only stronger as time goes on. It conjures up words such as 'freedom' and 'self-empowerment' (words that also happen to be associated with creativity). As such, there is a basic belief that cognitive freedom provided by mobility may lead to a creative work. Creativity shows its fullest form when a person is experiencing cognitive emancipation. In neuropsychology, there is a phenomenon called the 'A-ha effect.' This occurs when a pending problem is solved at an unexpected time or in unexpected circumstances, much like Archimedes' famous "eureka!" moment. Given the fact that we are rapidly and surely transforming into a mobile platform driven society, this possible link between creativity and mobility is worth to evaluating.

Among the many inquiries and studies focused on mobile technological features, probably the most talked about subject is *ubiquity*—the fact that Internet access is available anytime and anywhere. This well-known concept has been around for last two decades and it centers on *embedded* environment (Lyytinen and Yoo, 2002). The embedded environment refers to an environment that is embedded with those smart sensors that detect and account the activities within the environment to provide conveniences and accommodations to a user. Recently, with the advent of smart *personal* mobile technologies (e.g. smartphones), there has been a shift from *environment-ready-ubiquity* to *dynamic user-led ubiquity* in which a user "pulls" or "pushes" any data and information at their will regardless of time, location, and situation.

Mobility is the vehicle for this dynamic user-led ubiquity. In group collaboration, the constant movements of each member are continuously fed or "pushed" into other members' mobile device dashboards.

Through this continuity of movement, they engage in full-scale collaboration. In light of further technological developments such as wearable computing, this trend is accelerating. Consequently, this paradigm shift in our society entails changes in the attitude and behavior toward smart mobile devices and what is possible with such technology.

Creativity is a much-discussed topic that is not as easily attainable or definable as mobility. Many argue that, for its worth, creativity is in the eyes of a beholder. Nevertheless, there are many creativity theories which reflect diverse perspectives and interpretations of creativity (Kozbelt et al, 2010). Research on creativity and related topics always draws attention as it can be applied in many diverse fields. In particular, one common topic or question is how can the creativity output level of an individual or group be increased. While there have been slew of studies along this line of inquiry, there is a noticeable lack of studies whose focus is mobile technology-supported creativity. This is particularly surprising because it is not rare to see people accessing their mobile communication device and/or social media to communicate or share information and data, and thus collaborate with another individual or within a group. This lack of research calls for further investigations into these collaborative situations.

The overarching aim of this study is profiling the critical linkage between mobility and creativity. Under the umbrella of 'dynamic user-led ubiquity,' it is expected that the mobility will be the predominant variable that significantly influences both the link between mobility and creativity, as well any outcomes mutually produced by the two. One of the main stimuli in creativity are surroundings that trigger or add to the individual's sequential cognitive information process. An equally important fact is the freedom that is provided by mobility. As explained by 'dynamic user-led ubiquity' theory, when an individual feels emancipation physically, cognitively, and psychologically, then the individual is "free" to express to any extent, hence increasing creativity. If this is applied to a group of individuals, then it's group creativity.

More specifically, the question is: how does the mobility variable interacts with the creativity variable in their mutual outputs? Among the various forms of creativity, we focus on *cognitive* creativity, which refers to "a sequence of cognitive operations that gives rise to novel insights or ideas" (Kaufman et al, 2010, p. 217). More specific to this study, our study focuses on the novel insights or ideas that may arise in the midst of spontaneous exchanges occurring during group collaboration. Ultimately then, the question we seek to answer is: how does the mobility variable interact with an individual's or group's cognitive creativity exhibition in mutually producing the outputs?

The rapid growth of digital mobile ecosystems only heightens the significance of this study's research contribution. Theoretically, there is a significant paucity of studies on this track, and furthermore, mobility-creativity IS studies are virtually none existent. This study will contribute to the theoretical basis to many similar future studies and its findings will assist the refinement of theoretical frameworks. Practically, this study offers benefits to those venders and mobile technology developers who are always seeking ways to improve mobile-platform product performance and who seek to obtain insightful information concerning cognitive user behavior.

## **Theoretical Framework**

Creativity is neither a simple concept nor easy to define because it encompasses a number of applicable qualities. Nonetheless, here are some published definitions of individual creativity and group creativity: creativity is "the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context" (Plucker et al, 2004, p.90), "a sequence of cognitive operations that gives rise to novel insights or ideas" (Kaufman et al, 2010, p. 217), and "the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system" (Woodman et al, 1993, p.293).

According to Kozbelt et al (2010), there are about ten major creativity theories: developmental, psychometric, economic, stage and componential process, cognitive, problem solving and expertise-based, problem finding, evolutionary, typological, and systems. Each theory has its own merits and strengths with the perspective that it takes toward creativity, but no theory is emphasized at the expense of other theories.

In these theories, six facets of creativity—product, person, place, process, persuasion, and potential—are selectively applied to each theory's saliency. For the purposes of our study, we take special notice of the

person, place, process, and potential. Person refers to the first person and others in a group setting, place refers to the contextual circumstances or surrounding environment, and process refers to interactive and reciprocal relationships between person, place, and a given task. The place and process are rather obvious facets, but the meaning of the last facet, potential, is not so obvious. Potential refers to the “yet-unfulfilled possibilities and subjective processes” (Kozbelt et al, 2010, p. 25).

In surveying some of the creative models, we take a particular notice of models emphasizing the contextual or environmental factor. For instance, the work of Puccio and Cabra (2010) emphasizes the environment where ‘person’ and ‘process’ are interacting to each other. According to them, the ‘person’ and ‘process’ embodied environment is what breeds a creative outcome. The significance of external environment factors is also highlighted in other studies examining various different contextual situations (Amabile & Conti, 1999; Amabile et al, 2004; Tighe et al, 2003).

Amabile et al (1996) in particular introduce a creativity measure concept model with the following measurable [*categories* and *scales*]: [*encouragement of creativity* - organizational encouragement, supervisory encouragement, work group supports], [*autonomy or freedom* – freedom], [*resources* - sufficient resources], [*pressures* - challenging work, workload pressures], and [*organizational impediments to creativity* - organizational impediments]. The finalized scales are called *KEYS* – Assessing the Climate for Creativity. These are the categories and their items which are believed to be significant in influencing the creativity processes and its outcome.

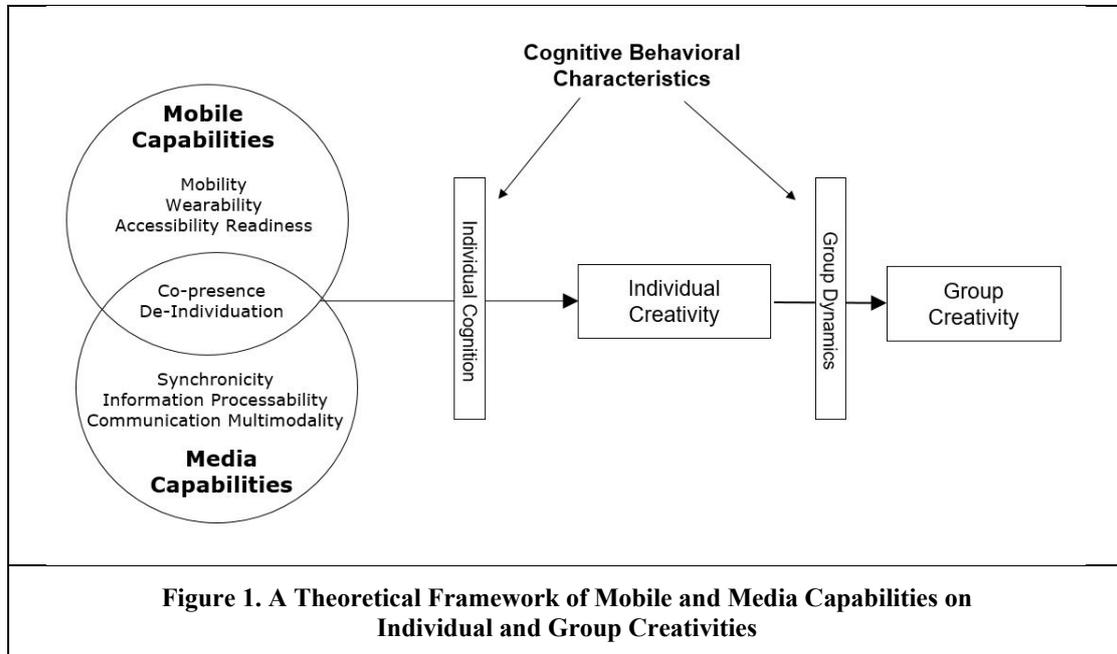
Woodman et al (1993) illustrate the interactional model of organizational creativity. The model presents individual, group, and organizational creativity processes and forms. Individual creativity is comprised of the following attributes: antecedent conditions, creative behavior, cognitive style/abilities, and personality. Group creativity is comprised of individual creativity, group composition, group characteristics, group processes, and contextual influences. Lastly, organization creativity is comprised of group creativity and contextual influences.

Ward and Kolomyts (2010) present three approaches that center on cognition and creativity: 1) the geneplore framework, 2) a convergence approach, and 3) the path of least resistance approach. The geneplore framework is characterized as “the development of novel and useful ideas as resulting from an interplay of generative processes that produce candidate ideas of varying degrees of creative potential and exploratory processes that expand on that potential” (p.94). The convergence approach identifies a number of seminal well-known anecdotes and published studies to formulate a new creative approach. Lastly, the path of least resistance approach takes a review of similar approaches and devise a new approach that will create a least resistance.

To complement these creative theories and concepts, we look at other theories and concepts. One theory is ‘technology affordances and constraints’ (TACT) (Majchrzak and Markus, 2012). TACT stems from ecological psychologist James Gibson’s idea of “what affordances can do” (Gibson, 1977). In a nutshell, this idea is that an actor sees a meaningful combination from indiscriminately available objects in a given context whereas a single object cannot; the meaningful connotes a subjective value. Choi and Im (2015) elaborated on the idea of ‘communication affordance,’ applying in their recent study. In their study, they used a meaningful combination of mobile communication device and the social media platform Twitter to equip an individual to ubiquitous communication for small group collaboration and problem solving. This ‘freedom’ to communicate at anywhere and anytime operationalizes the ‘liquidity communication’ in ‘liquidity times’ (Bauman, 2007).

The other theoretical concept this study proposes to use is the “Aha!” psychological effect. Kounios et al (2006) and Jung-Beeman et al (2004) report that there is a burst of gamma brain waves just before an individual discovers a solution to a problem. Neurologically, a certain area of brain—the anterior superior temporal gyrus—gives off these gamma waves right before a possible solution bursts. However, when an individual is conducting a series of analysis en route to solve a problem, this “Aha!” does not happen; when the Greek scholar Archimedes shouted “Eureka!” out that was *only* when he saw the bath tub water overflowing which linked to the crown weight measurement. This story emphasizes the importance of person (Archimedes), context (overflowing bath tub – place), freedom (taking a bath – process), and potential (Eureka!). We relate this to our study where the mobility attributes to context and freedom and creativity to potential.

In summary, we draw upon the following constructs for this study's theoretical framework: individual and group creativity, individual cognition, group dynamics, communication affordances, contextual influences, freedom, and potential which are driven by mobile and media capabilities. A theoretical framework is illustrated below:



For those media capabilities in above figure, we refer to the work of Choi and Im (2015). A more detailed and extensive analysis of them is expected in a later report as there is page limitation in this report.

In speaking of the creativity magnitude, there are “smaller c” and “larger c” (Kozbelt et al, 2010). Typically, the smaller c refers to a creativity work that is more subjective and often carried out everyday whereas the larger c refers more objective and eminent. In this study, we relate the smaller c to an individual creativity product and the larger c to a group creativity product.

## Empirical Experiment Design

To empirically test the proposed framework and hypotheses, we are planning to conduct multiple field experiments—pilots and main—in various settings. For the individual-level and group-level creativities, both academic and business settings are utilized. In the case of the academic setting, published studies have investigated individual or group creativity in terms of the problem solving and group idea generation of student groups (e.g., Goncalo and Staw, 2006; Taggar, 2002). On the other hand, in a business setting, organizational characteristics such as leadership style and work environment have been studied in line with individual and group creativity (e.g., Shin and Zhou, 2003; Zhou and George, 2001).

Each setting has its own strengths. For example, an academic setting is easier to control and compare than the experimental and base groups due to a certain level of homogeneity among student groups, while the business setting is more relevant to the real-world contexts using employee's job-related tasks. In either setting, the major logistical steps for our experimentation will involve: (1) designing the experiments and tasks, (2) instrument development, (3) securing the participant pool, (4) administering the experiments, and (5) analyzing the data collected. These steps are elaborated below.

**(1) Designing the experiments and tasks:** We will use a quasi-experimental design, in which only the post-test conditions will be measured for both experimental and control groups. First, the manipulation of our experimental design is a mobile media environment. In our research, the mobile media capability refers to the capability carried by the social collaboration media (e.g., social networking

apps like Twitter and Facebook) embedded in the personal devices (e.g., smart phones). The manipulation groups will use such a mobile media collaboration platform to solve their given tasks. On the other hand, the control groups will work in a traditional group collaboration environment such as face-to-face only meetings to solve the same tasks assigned. This manipulation setting will apply to both academic and business settings of field experiments.

**(2) Instrument development:** The validity of the experiment treatments and the manipulation effects are to be secured for the validity of findings. We will develop both objective and subjective measures to assess the degree of participants' exposure to mobile and media capabilities (see Figure 1). In particular, the objective data can be achieved using the log data of mobile device and social media or collaboration apps. The geographical data can also be utilized to evaluate the degree of locational freedom. In addition, the self-reported observations on the treatments can be gathered through a post-test survey. For this, survey measurement of the components of mobile media capability will be developed, drawing from the relevant literature.

In the creativity literature, particularly, various approaches have been proposed and successfully used to assess the creativity at individual and group levels. For example, Taggar (2002) uses both objective and subjective measures for group-level creativity: the average score on the written reports of each group (objective) and the sum of the creativity ratings of each member in a group (subjective). Gonchalo and Staw (2006) use the total number of ideas generated by each group during the given idea generation period (objective). Likewise, at the individual level, similar approaches were used to assess individual members' creativity (Taggar, 2002; Zhou and George, 2001). Through the pilot runs, we will evaluate these instruments and select the measures that are germane to our study.

**(3) Securing the participant pool:** The objective is to secure as many participants as possible from both undergraduate and MBA students. The pilot runs are expected to be administered mostly with undergraduate students, while the main experiment is expected primarily involve MBA students. Most of MBA students are full-time working business professionals where their participation contributes to the validity and generalizability of the result. To meet the objective of this participant pool, we target multiple business schools in the United States who have diverse backgrounds in terms of demographics of students. In addition, we plan to conduct few runs with one or more business organizations, and factors such as organization size and structure, industry difference, tenures, leadership styles, etc. will be controlled for the external validity.

**(4) Administering the experiments:** A preliminary participant background check will be performed to obtain background information about the participant's experience with the technologies examined in this study. Each group will have five members (e.g., Taggar, 2002). In the grouping process, all possible compounding factors such as gender, university major, age, education level, and others will be controlled.

The experimental groups will be asked to use a specific mobile media collaboration tool, such as the mobile apps of Twitter or Facebook and the base groups will hold face-to-face meetings and record their conversations during the meetings. To both groups, the same set of collaboration tasks, all set to take place over a ten-day period, will be assigned. Lastly, at the conclusion of the experiment the participants will be requested to complete an online post experiment questionnaire.

**(5) Analyzing the data collected:** By the end of the experiments, we will achieve two types of data to be analyzed. First, we will achieve a data set from our direct observations on the mobile media platform. For example, the interactive conversations on Twitter in the form of tweets, retweets, direct messages, and replies will be downloaded from the participants' account. For the base groups, we will create conversation scripts using their meeting records. In addition to these direct observations, we will also use the self-reported post experiment questionnaire data to test our hypotheses.

Second, a series of t-tests will be conducted to compare the experimental and base groups' creativity at both individual and group levels. Prior to the comparison, the measurements' validity and reliability will be set up. Lastly, a general linear model (GLM) analysis will be carried out on the data sets. The independent variable is the two different collaboration modes; either the mobile media or face-to-face collaboration.

## Expected Contributions and Future Research

This study focuses on the gap or missing link between creativity and mobility where there may be meaningful reciprocities yielding saliences and synergistic effects. By using the published creativity assessment scales—fluency, flexibility, extensiveness, and originality—we focus on individual's and group's creativity products. We expect this study will deliver a set of empirical findings that will impact on both theoretical and practical sides. On the theoretical side, the validation between creativity and mobility may serve as a basis to future research inquires that touch on the interactivities of these two topics. On the practical side, this will contribute to the use of mobility in addressing creative process or outcome. Additionally, business vendors may consider those features that are impacted by the results. As for a next step, we look to prepare a few rounds of pilot runs aimed to validate and fine tune the experiment protocols, procedures, and instruments.

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