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An Autopoietic View of the Ba and Its Adaptation: the Dynamics of Acquaintanceship, Knowledge Gaps, and Importance of the Concept in Knowledge Creation

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Abstract

There is scant literature on ba's behavior when approached by a third individual. The present study explains, from a ba standpoint and through the lens of autopoiesis theory, factors that increase the chances of a third individual participating in ba and in its knowledge-creating activity. An empirical study was conducted to test the hypotheses of the factors. Eight experiments were carried out and analyzed with a checklist. A comprehensive analysis of points distance calculation between experiments scoring low or high in the studied factors was made to verify the hypotheses. Among the factors studied, it was found that acquaintanceship and awareness of the importance of ba's concept for knowledge creation worked to make ba more accessible, allowing a third individual to flow into it, participate in it, share its context, and create knowledge. The study acknowledges the limited number of experiments conducted and, owing to the sample size, the results did not go through the rigidness test of statistical analysis. This is a first attempt to study ba from an autopoietic view and, through experimentation, clarify factors of ba standpoint that directly affect its adaptation when approached by a third individual.

Keywords: *Ba; ba's adaptation; acquaintanceship; awareness; knowledge creation.*

INTRODUCTION

Organizations create knowledge through symbiotic and dynamic use of explicit and tacit knowledge ("knowledge conversion") and, this creation is interaction among individuals (Nonaka, Toyama, Nagata, 2000).

Sharing individual knowledge triggers the knowledge creation processes. It enables others to learn from the existing tacit and explicit knowledge to create new experience, which is essential for sustainability of organizations. Nonaka (1998) argues this is a highly dynamic and spiraling process, creating what can be visualized as a pool of knowledge available to the members of the organization. The SECI model of knowledge creation

visualizes a spiral that encompasses the dynamic interaction of the different types of knowledge in the modes of SECI, that is, (1) socialization (tacit to tacit); (2) externalization (tacit to explicit); (3) combination (explicit to explicit); and (4) internalization (explicit to tacit) (Nonaka & Takeuchi, 1995).

The basis of the model is the interactions among individuals. These interactions then travel through different modes as spiral and, knowledge creation occurs all along. This process is bound to a context and organizations support it by providing platforms that will facilitate sharing (Von Krogh, Ichijo & Nonaka, 2000).

Nonaka and Konno (1998) explored the concept of "ba" (場) originally coined by Japanese philosopher Kitaro Nishida (Nonaka, Reinmoeller & Senoo, 1998), defined as a shared space for emerging relationships, which serves as a foundation for knowledge creation. It is a shared context that enables knowledge creation (Von Krogh *et al.*, 2000), such an activity is situational, fleeting, dynamic, and depends on human action. It is in the "Ba" that individual knowledge is made public, justifying its importance in an organization's environment.

Considering that two individuals are engaged in a knowledge-creating activity, in ba, we were intrigued by how it would change if a third individual were to approach for participation. This study explores the concept of ba, autopoiesis, and conducts experiments to test the hypothesis and draw conclusions.

THEORETICAL BACKGROUND

Ba (場)

Von Krogh, Ichijo, and Nonaka (2000) claim that knowledge is embedded in the ba, and it serves as the enabling context for knowledge creation. Nonaka and Konno (1998) define ba "as a shared space for emerging relationships," whether physical (e.g., facilities of an organization), virtual (e.g., e-mail and online forums), or mental (e.g., a shared experience and mental models). Ba may be a combination of any of these three relationships.

They emphasize that, unlike the ordinary interactions in our daily lives, in the ba, each individual transcends his/her barriers and recognizes him-/herself as part of something bigger. To fully participate or engage in ba means "to get involved and transcend one's limited perspective or boundary" (Towell & Towell, 2001). The present study contends that it is one's willingness to give and take.

According to Nonaka and Konno (1998), "ba provides a platform for advancing individual and/or collective knowledge," whether within such a platform where personal knowledge is made public and vice versa, where the SECI model of knowledge creation is built effectively.

Ba can occur in informal circles, project teams, e-mail groups, online forums, vacation, and so on (Nonaka & Konno, 1998), bound by space and time. It is in such a context that individuals share their feelings, experiences, emotions, mental models, e-mails, articles, manuals, and conceptualize a dynamic context of networks and media, thus fostering knowledge creation (Corno, Reinmoeller & Nonaka, 1999).

The characteristics of ba are listed in Table 1:

After consolidating the essence of ba and environmental characteristics (Senoo, 2004), we identified two distinct coexisting components of ba: physical and mental.

A **physical** component (e.g., physical space, organization's facilities, and information technology) is related to the concept of explicit knowledge, which can be shared and verbalized through tangible means, considering that it has been codified and is part of the organization's explicit knowledge pool. Hereafter, this will be referred to as "physical ba."

A **mental** component (e.g., shared experiences leading to shared memories, feelings, ideas, senses, etc.) is related to concept of tacit knowledge, as it is difficult to be shared through material means, since it is acquired by doing a particular activity and blended with feelings and mental models that are difficult to be conveyed verbally or in a written form. Hereafter, this will be referred to as "mental ba." We argue that a ba cannot exist without the two identified components. The mental ba needs its physical counterpart and vice versa. Therefore, ba can only exist if there is a physical medium where it can occur. They complement each other, are

Table 1: Characteristics of the ba

Characteristics of the ba	Our interpretation
Complex and ever changing (Nonaka, Toyama & Konno, 2000).	It changes as situation/environment changes.
It sets a specific boundary among its participants, but such a boundary is still open (Nonaka *et al.*, 2000).	"Between you and I" nature, so participants can share a context, even though its membrane is permeable.
It possesses a fluid boundary that may change quickly. Participants set the change (Nonaka *et al.*, 2000).	Ba structure changes; changes carried out by participants; this happens from within it.
It enables its participants to share a specific time and space (Nonaka *et al.*, 2000).	It is powerful and profound, transcends its "here and now" nature and is stored in one's mind and heart.
A living place where knowledge creation happens (Nonaka *et al.*, 2000).	It exists among individuals who interact, share, and create knowledge.
No fixed membership (Nonaka *et al.*, 2000).	It has a permeable membrane. Ba allows participants to enter and leave it according to their needs and will.
It takes place at the micro and macro levels (Nonaka *et al.*, 2000).	It consists of small groups, a project, two individuals (the micro-level). Departments, organizations, business units (macro-level). Multiple bas occur in multiple levels.
Individuals do not just participate in a ba, they relate to it (Nonaka *et al.*, 2000).	It requires a relation to a shared context, so one perceives it as meaningful and participates in it.

interdependent, and one works to fill the voids of the other.

The identification and separation of of ba in two components help the researchers narrow the scope of the study and focus their efforts on the mental component.

So, in this study, we defined the mental ba as an invisible, mental link between two (or more) individuals sharing a context. It emerges dynamically through face-to-face interaction at a given moment, and a physical ba supports it.

The smallest possible configuration of the ba with two participants was analyzed. The two individuals share a mental context to which they relate and, consequently, a similar emotional frequency (or tune) is reached by them participating and contributing to the ba that serves as a foundation for creating knowledge.

Because ba affects emotions (i.e., sadness, happiness, startle, surprise, gratitude, love, and passion), feelings (i.e., tiredness, excitement, frustration, powerfulness, and powerlessness), memories (i.e., a trip with friends), and it possesses a "here and now" nature that binds it to a point in time, the mental ba can be considered fleeting and delicate, that is, it may be broken easily. To protect this tie and to preserve its relation to context, we assume that participants erect a protective mental boundary to prevent it from cracking when perturbations in the surroundings occur (Figure 1).

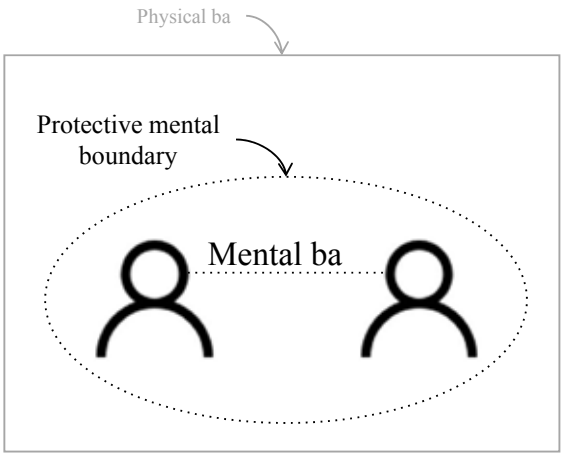

Figure 1: Ba's illustration in the present study

From such an effort at protection, the **protective mental boundary** possesses strength, and it refers to permeability this membrane is to protect a momentary ba. Such strength impacts ba's permeability, allowing the flow of the third individual into the ba for participation and shared context. This force affects an existing ba's level of openness to a new individual who desires to be positively absorbed by it.

Nonaka, Konno and Toyama (2001), while studying the emergence of ba and case studies to

illustrate how this happens, depicted the Japanese company Maekawa Seisakusho and its independent companies within the holding as an example of many ba which formed an autopoietic system.

Taking the depiction further and breaking it down to the level of a single ba to study its adaptation, we explored some concepts from *autopoiesis* and structural coupling developed by Maturana and Varela in the 1970s. Although they are biologists, the present study borrows some of their ideas to explain the relationship between the surrounding's perturbations and adaptation.

Autopoiesis

While studying the nervous system, Maturana realized that perception, as the word itself denotes, occurs from the inside toward the outside and must be studied from this perspective. Perturbations originating from the environment should not be studied as the real causes of changes in a given system, but, instead, they merely trigger changes of states within the nervous system (Winograd & Flores, 1987).

With regard to Maturana, in "understanding an organism as a structure-determined system we view it in terms of its components and the interactions among them" (Winograd & Flores, 1987) and from the perspective of a closed system, Maturana distinguishes between organization and structure of a living system. **Organization** refers to the relationships between components that give a particular system its identity (Mingers, 2000). Structure, on the other hand, refers directly to the "components and relations between them that constitute a particular example of a type of system" (Mingers, 2000).

Accordingly, a system possesses a specific structure (components and their relations). However, their specific organization allows identifying them as "a member of a particular type" (Mingers, 2000). Structure supports a particular organization and, as long as the organization is maintained, the structure may change.

Maturana and Varela characterize an organized living system as "autopoietic" (Winograd & Flores, 1987) and *autopoiesis* is the process of self-production that a living system undergoes to regenerate its network or processes in its structure while maintaining its organization to continue as a specific entity, once "an autopoietic system holds its constant organization together and defines its boundaries through the continuous production of its components" (Winograd & Flores, 1987). If a living system's self-production process suffers any interruption, it loses its organization and then disintegrates.

It is this constant threat of disintegration and the perception by the living system that pushes it to continuously change its structure's processes and network to respond to the environment's perturbation, maintain its organization, and avoid disintegration. It adapts to ensure that the system keeps itself structurally coupled to the medium.

There are several sources of perturbation, including other living systems of the same or different organization. Those systems will interact, and each of them changes in its structure's network and processes to avoid disintegration and to remain structurally coupled to the medium. According to Maturana, a *consensual domain* arises, and it appears as a network of sequences of mutually triggering interlocked conducts and these conducts are both arbitrary and contextual (Winograd & Flores, 1987).

Autopoiesis and the concept of ba

Kay and Cecez-Kecmanovic (2003) contend that "social systems themselves are *not* autopoietic, but that the processes described within autopoietic theory may be used to understand better the generative processes that give rise to organizations and other social systems" and, therefore, we borrowed part of these concepts in an attempt to clarify the behavior of a smallest possible ba (two individuals), which further includes a more extensive third-order system (i.e., organization).

Moreover, for the sake of practicality and usefulness, Kay and Cecez-Kecmanovic (2003) proposed that it is to conceptualize organizations as scenery where individuals are structurally coupled, going through interactions each moment. As a result of such interactions, they have developed a consensual domain (a language, actions, and meaning attribution) based on the distinctions of their shared history (Key & Kecmanovic, 2003).

Similar to an organization, but in a much smaller

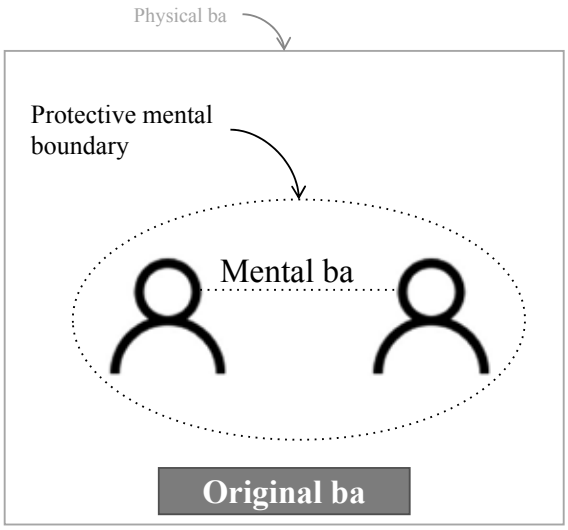

Figure 2: Original ba

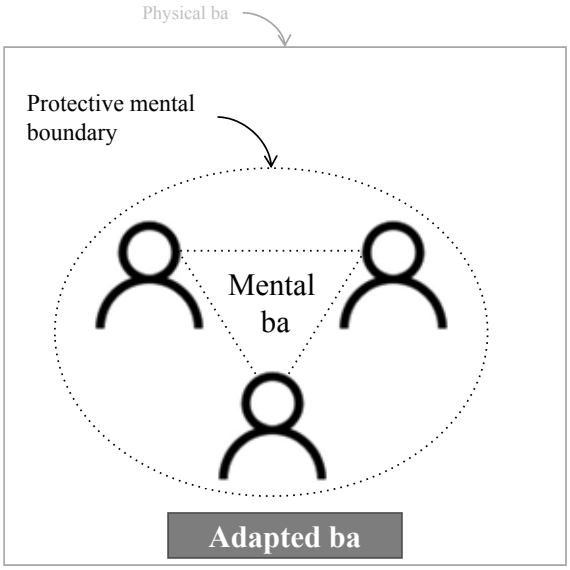

Figure 3: Adapted ba

scale, we view ba as two structurally coupled individuals. Although knowledge is an individual asset within a living being, it is in this consensual domain (shared context) where it is verbalized to become a public asset related to that moment that can be utilized by the two participants.

In this study, we contend that the two individuals engaged in the ba (that moment's shared context) are reacting to perturbations caused by each other as well as to those caused by the medium. In both the cases, they are the triggers to possible changes in the structure network and processes. We assume the environment is the organization itself with its people, physical space, processes, and norms.

Of all the possible perturbations, we singled out the approach of a third individual to ba to become a participant. In other words, the new individual wishes to share the same context already shared by original ba.

The ba composed of two participants before being approached by a third individual is, hereafter, referred to as the original ba (Figure 2).

When approached by a third individual to participate, how does the original "ba" behave? Does it adapt and absorb the third individual? Does it intentionally ignore the perturbation, continue without absorbing the third individual and survive? Alternatively, does it not adapt and disintegrate?

The second type of ba in this research is called **adapted ba**, and it results from the absorption of the third individual by the original ba. In the adapted ba, the third individual is a participant. We view this result as positive once there is adaptation, survival, and the ba keeps itself structurally coupled to the environment (Figure 3).

Based on the reviewed literature, we define "**adaptation**" as the change in the ba's structure (from two to three individuals) while maintaining its organization (those three individuals continue to be connected by a mental link, share a given context, and engage in knowledge creation activity and the boundary works to protect this delicate tie). On the other hand, "**disintegration**" is defined as the lack of change in the ba's structure, resulting in change in its organization (a mental link no longer connects the two individuals who belonged to the original ba and, consequently, they do not share the same context anymore where knowledge creation was occurring).

Desired path of ba

With the theories combined through borrowed concepts, we then drew the desired path of a ba, with adaptation as the desired result (Figure 4).

The scenario studied consisted of two individuals engaged in a knowledge-creation activity, sharing a context, which constitutes the original ba. It is then approached by a third individual, desiring a path of his/her absorption as a participant and

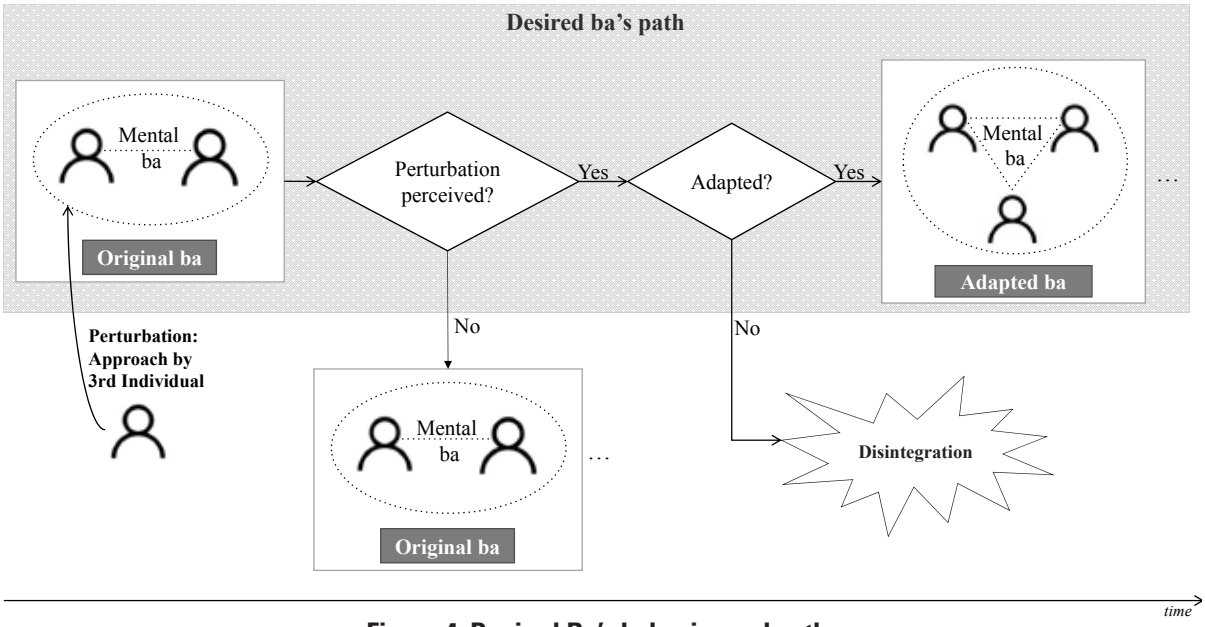

Figure 4: Desired Ba's behavior and path

knowledge co-creator.

Approach by the third individual is considered a perturbation from the environment. It can be either perceived or not. "No" path is taken when the original ba perceives it as irrelevant, rejects it, and there are no changes to the network and no processes in its structure are triggered. In other words, the original ba keeps itself organized and the third individual neither participates nor becomes a knowledge co-creator.

If the perturbation is perceived and judged as relevant, the "yes" path would be taken. In this case, does the original ba adapt or disintegrate? If the answer to the second test is "no," then it disintegrates; however, if it is "yes," the adapted ba emerges.

In this study, Ba's adaptation is seen as the desired path once the ba is the foundation for knowledge creation and, then, this supports Nonaka and Takeuchi's SECI model. The absorption of the third individual by the original ba and considering him or her as a knowledge co-creator is considered as a fruitful activity. Considering how supportive of knowledge creation the concept of ba is, we consider it as positive when a new individual becomes a participant.

Furthermore, the adaptation is a plausible path, because, according to autopoiesis theory, living organisms may structurally couple with other organisms and with its environment to avoid disintegration.

PROBLEM AWARENESS AND RESEARCH PURPOSE

Knowledge about what happens to the original ba when it is approached by a third individual to become a participant is scarce. Studies about ba's behavior in this scenario are obscure, and, from the original ba perspective, there is no clear answer to how it perceives perturbations and responds to them.

Past studies have proposed factors that improve or decrease the probability of adaptation, such as absorptive capacity, creative tension, and resistance to change (Koskinen, 2009). These are, however, at an organization's level, and each has a long-term characteristic that cannot be attributed to ba. In fact, such factors are either built or changed through extensive hardwork and time.

The aim was to clarify (or raise) the factors that increase the possibility of ba's adaptation from its standpoint, given its characteristics. It was not found much on factors that would foster such behavior from this standpoint.

RESEARCH QUESTION

Being ba's adaptation the desired path when an original ba is approached by a third individual to become a participant in it and, from this ba standpoint, what are possible factors that can directly affect adaptation?

FACTORS, RESEARCH MODEL, AND HYPOTHESES

The factors in the study were selected from ba's standpoint and past research on organizations and modified. Factors from inside the original ba to the outside were needed.

Factor 1 (F1)—Original ba's acquaintanceship with the third individual *(Acquaintanceship)*

Ba may be virtual, physical, and mental, consisting of a shared experience (leading to shared memories), shared values, and mental models. It is a shared context and assumed individuals have met at a specific time, "the knowledge of people, places and things" (Colman, 2015). Shared mental models result in more effective communication, particularly when teams comprising individuals must come together to make sense of complex or equivocal cues (Klimoski & Mohammed, 1994; Mathieu *et al.*, 2000; Moreland, 1999; Moreland, Argote, & Krishnan, 1996 *in* Alge, Wiethoff & Kleinc, 2003). Being the original ba acquainted with the third individual, would it play any role in his/her absorption?

Factor 2 (F2)—Original ba's awareness of its existing knowledge gaps *(Knowledge gaps awareness)*

Knowledge gaps awareness refers to the awareness of the ba's participants regarding the lack of knowledge of their own topic, and, therefore, the existing knowledge gaps in that momentarily shared context. It is related to original ba's participants' self-judgment regardless of a third individual. Chen and Lin's (2004) study found that developed and experienced firms are more likely to develop knowledge internally without sourcing capabilities outside its facilities; this knowledge would come from past successful experiences. Adapting this finding to the present study, once the original ba assesses its problem-solving capabilities, would it seek help outside of its boundaries?

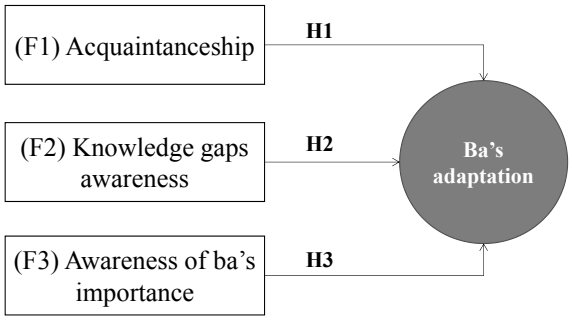

Figure 5: Research model

Factor 3 (F3)—Original ba's awareness of "ba's concept" importance for knowledge creation *(Awareness of ba's importance)*

Towell and Towell (2001) state that "critical to the effectiveness of ba is the person's awareness and acceptance of it and its relationship to knowledge creation," understanding the benefits of the concept for knowledge creation, once it forms the foundation for such activity, thus supporting the SECI knowledge creation model.

The research model developed comprised three factors directly affecting ba's adaptation, and it is the dependent variable in our study (Figure 5). The three factors were the independent variables. To find out whether they had any impact on adaptation, their score would be either high or low. A detailed explanation of the scoring is given further.

Moreover, from the research model, we developed the following hypotheses to be tested:

- **Hypothesis 1** *Original ba's acquaintanceship with the third individual directly affects ba's adaptation*;
- **Hypothesis 2** *Original ba's awareness of its existing knowledge gaps directly affects ba's adaptation*;
- **Hypothesis 3** *Original ba's awareness of "ba's*

concept" importance for knowledge creation directly affects ba's adaptation.

RESEARCH METHODOLOGY

An empirical study was made to test the hypotheses in which the results were computed. Due to the limited number of potential participants, their schedule availability, and a restricted timeframe, only eight experiments were conducted and analyzed with a checklist of points from an original ba's standpoint. The experiments were video-recorded, and it was possible to use all the recordings during observation and analysis.

A sample of participants including students from different laboratories and nationalities was selected as we attempted to simulate a complex environment where a diverse pool of individuals with different skills sets, backgrounds, and interests would come together.

To design the original bas to be approached by the appropriate third individual, we measured the three factors before the experiments and assigned the participants based on these measurements.

Experiments and bas' design

Bas designed for the experiments were based on the combination of factors 1 (one), 2 (two), and 3 (three) scores of "high" or "low," (Table 2).

There were eight bas and, therefore, there would be eight experiments, followed by the experiment structure, flow, and time line design:

1. The original ba would try to solve the Travel Agency case using the Business Process Model and Notation (BPMN) diagrams to ensure there was a shared context and, consequently, an existing ba;
2. The original ba would be unaware that a third individual would approach it. While trying to solve the case, the third individual would approach it;
3. The third individual would try to become a participant in that ba. His/her absorption would be analyzed. After a specified period, the third individual would leave the experiment;
4. The original ba would continue trying to solve the case until asked to stop;
5. All experiments would be conducted in a room designed specifically for experiments with the necessary equipment.

Table 2: Eight bas and experiments

Ba	(F1) Original ba's acquaintanceship with the third individual	(F2) Original ba's awareness of its existing knowledge gaps	(F3) Original ba's awareness of "ba's concept" importance for knowledge creation
1	LOW	HIGH	HIGH
2	LOW	HIGH	LOW
3	LOW	LOW	HIGH
4	LOW	LOW	LOW
5	HIGH	HIGH	HIGH
6	HIGH	HIGH	LOW
7	HIGH	LOW	HIGH
8	HIGH	LOW	LOW

Figure 6 outlines the experiments flow and 0 min to 8 min is called the warm-up phase (shared context emergence); 8 min to 22 min is the approach phase (the third individual arrives and tries to participate in the case-solving activity); 22 min is the wrap-up phase (the third individual leaves the experiment); at 25 min, the end (experiment terminates).

To assign participants to the original bas, factors 1 (one), 2 (two), and 3 (three) had their scores measured "high" or "low."

(F1) The original ba's acquaintance with the third individual referred to how well the original ba's participants believed they knew the third individual. Its levels were the starting point to design the bas for the experiment and who would approach each point. An "acquaintanceship level survey" was answered by students to explain how well they knew the person in the photo. There were two questions:

1. *About the person in the picture (Mr/Ms XXX), I believe…*
   - *We are close friends;*
   - *We are friends;*
   - *We are acquaintances;*

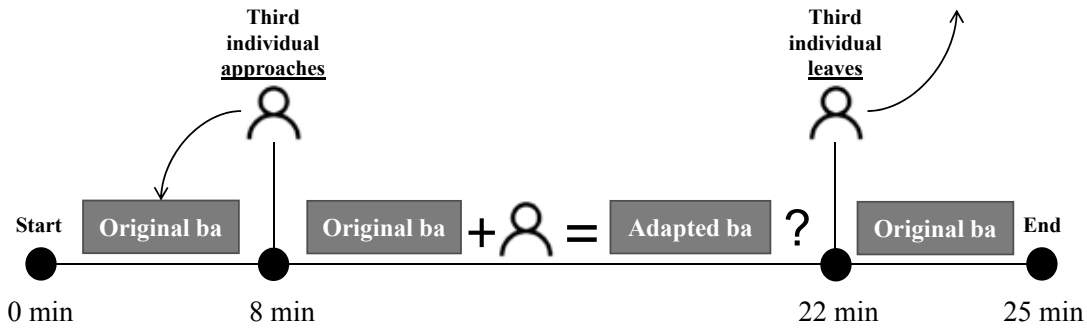

Figure 6: Experiment flow and timeline

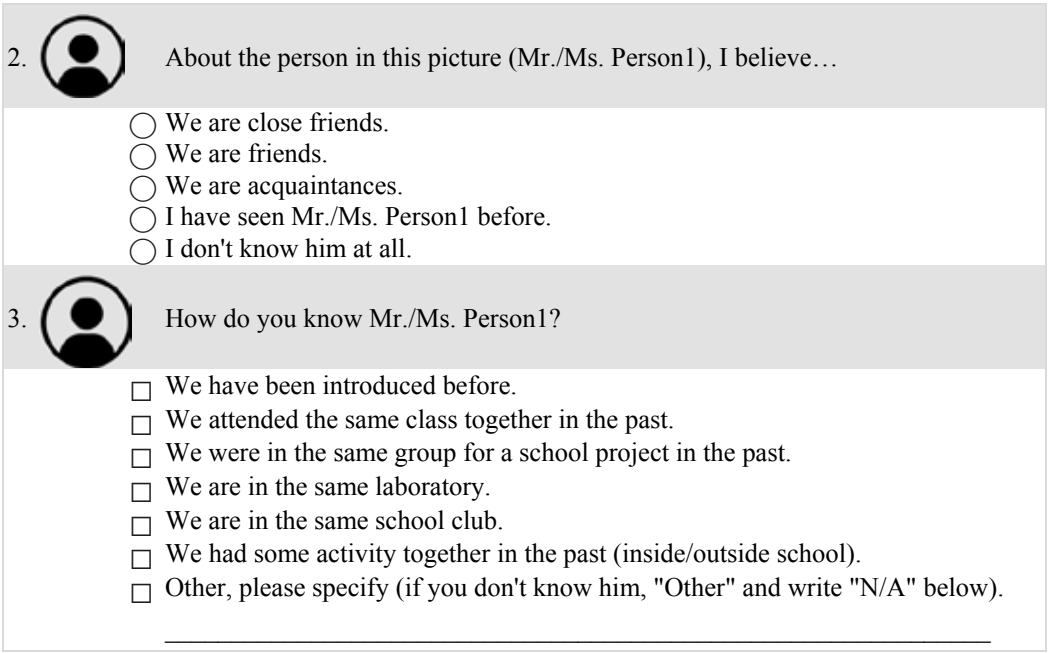

Figure 7: Acquaintanceship level survey structure

- *I have seen Mr/Ms XXX around before;*
- *I don't know him at all.*

2. *How do you know Mr/Ms XXX?*
   - ✓ *We had been introduced before;*
   - ✓ *We attended the same class together in the past;*
   - ✓ *We were in the same group for a school project in the past;*
   - ✓ *We are in the same laboratory;*
   - ✓ *We are in the same school club;*
   - ✓ *We had some activity together in the past (inside/outside school);*
   - ✓ *Other, please specify (If you don't know him/her, please choose "Other" and write "N/A").*

Respondents were able to choose one answer only for the first question. However, for the second question, they could choose multiple answers (Figure 7).

Respondents were shown pictures of five different students from different laboratories in the Department of Industrial Engineering and Economics of the Tokyo Institute of Technology. They were unaware that these students would pose as the third individuals in the experiments. Items such as "we are close friends" and "we are friends" scored "high" acquaintanceship level, whereas the items

Table 3: Original bas participants, third individual and laboratory

Ba	(F1) Original ba's acquaintanceship with the third individual	(F4) Original ba's awareness of its existing knowledge gaps	(F5) Original ba's awareness of "ba's concept" importance for knowledge creation	3rd Individual	Original Ba
1	LOW	HIGH	HIGH	3rd Ind. C	Ind. 1 + Ind. 2 (S-Lab)
2	LOW	HIGH	LOW	3rd Ind. NG	Ind. 1 + Ind. 2 (E-Lab)
3	LOW	LOW	HIGH	3rd Ind. NK	Ind. 1 + Ind. 2 (I-Lab)
4	LOW	LOW	LOW	3rd Ind. NK	Ind. 1 + Ind. 2 (I-Lab)
5	HIGH	HIGH	HIGH	3rd Ind. NK	Ind. 1 + Ind. 2 (S-Lab)
6	HIGH	HIGH	LOW	3rd Ind. NI	Ind. 1 + Ind. 2 (E-Lab)
7	HIGH	LOW	HIGH	3rd Ind. NK	Ind. 1 + Ind. 2 (I-Lab)
8	HIGH	LOW	LOW	3rd Ind. C	Ind. 1 + Ind. 2 (I-Lab)

"we are acquaintances" or "I have seen Mr./Ms. XXX around before" scored "low." A respondent would only participate in a ba if she or he chose one of those four choices. The response to the second question would serve as a further confirmation of the answer to the first question.

Respondents of the acquaintanceship survey belonged to laboratories S, I, and E. I-Lab members had been extensively exposed to BPMN diagrams as it was one of the laboratory's research topics. They knew the case could be solved. They scored "low" in **(F2) original ba's awareness of its existing knowledge gaps**. S-Lab and E-Lab members had not been exposed to the topic and scored "high" in F2.

With regard to **(F3) Original ba's awareness of "ba's concept" importance for knowledge creation**, participants were trained to score "high" or "low" through instructions. To make the bas score "high" in F3, they were explained in detail about the research and the importance of the concept. The importance of ba's openness to newcomers was highlighted. On the other hand, those who scored "low" were given only the instructions of the task. Table 3 shows the designed bas for the experiments.

The participants were carefully and specifically selected for each experiment to compose the original ba or to be the third individual. Their names were replaced with "3rd individual," "Individual 1," and "Individual 2" to maintain their privacy.

The approaching third individuals were trained to perform the role. They were instructed about their expected behavior throughout the experiments (approach original ba and try to become a participant). Although instructed to leave the experiment at 22 minutes, he or she was fine to continue if felt comfortable in continuing the experiment. Such a scenario would be the best possible result because it would constitute adaptation of the ba to this environment perturbation.

Analysis checklist of Ba's adaptation

A checklist was used to analyze the experiments and understand whether or not an adapted ba emerged during experiments analysis. It would ensure that the analysis would be impartial, keeping observers on track to avoid bias in the results. It was based on the Braaten (1991) five factors model of group cohesion on how they remain together throughout an activity.

Attraction and bonding factors refer to the level of attraction of a group to retain a person (Braaten, 1991). According to the author, related concepts are admiration, affiliation, belongingness, and collaboration:

1. *Original ba appeared as if the third individual was important to the activity.*
2. *Original ba seemed attracted to the third individual.*
3. *Original ba identifies itself with the third individual's reasonable similarities (e.g., of values, educational level, religion, and philosophy of life.).*
4. *Original ba admired the third individual.*

5. *Original ba appeared compatible with the third individual.*
6. *Original ba showed enthusiasm toward the third individual.*
7. *Original ba showed excitement toward the third individual.*

Support and caring factors refer to a warm and safe place open to everyone (Braaten, 1991). Related concepts were identified as affection, affective regard, approval, confirmation, interest, and trust:

8. *Original ba showed to the third individual his or her importance in solving the case.*
9. *Original ba communicated to the third individual his or her importance in solving the case.*
10. *Original ba showed some kind of positive affection toward the third individual.*
11. *Original ba showed approval of the third individual.*
12. *Original ba communicated the approval of the third individual.*
13. *Original ba showed interest in the third individual's opinion.*
14. *Original ba showed trust in the third individual.*
15. *Original ba showed conviction about the third individual's capabilities.*
16. *Original ba communicated conviction about the third individual's capabilities.*

Factors of **listening and empathy** are defined when participants listen to colleagues attentively and accurately (Braaten, 1991). Related concepts are process focusing, reframing, empathetic resonance, and working through the following:

17. *Original ba listened to the third individual's input.*
18. *Original ba used the third individual's input to solve the case.*
19. *Original ba showed some kind of agreement with the third individual's input.*
20. *Original ba used their words carefully when responding to the third individual's input.*
21. *Original ba seemed to try and work positively with the third individual.*

Factors of **self-disclosure and feedback** are defined by participants acknowledging a breakthrough and feeling excitement or relief for achieving something (Braaten, 1991), usually verbalizing it. Related concepts are humor, openness to influence from within, spontaneity, transparency, mutual stimulation, confrontation, challenging, and openness to influencing others.

22. *Original ba gave feedback to the third individual's input.*
23. *Original ba made friendly jokes with the third individual.*
24. *Original ba seemed to be transparent toward the third individual.*
25. *Original ba appeared to feel comfortable with the third individual.*
26. *Original ba behaved spontaneously toward the third individual.*
27. *Original ba appeared excited during the whole exercise.*

The factors of **process performance and goal attainment** (Braaten, 1991) refer to the objective of activity and how much the participants are willing to cope with the external factors to achieve it (Braaten, 1991):

28. *Original ba remembered that they needed to solve the case.*
29. *Original ba worked with the third individual to solve the case.*

The last two items in the checklist summarized what was observed throughout the experiments and presented the result to ba's adaptation:

30. *Original ba accepted the third individual into it solving the case.*
31. *Adapted ba emerged and tried to solve the case.*

HYPOTHESES TESTING AND RESULTS

The hypotheses were tested through eight experiments, each experiment was an original ba. Five out of the eight original bas adapted are as shown in Table 4.

Table 5 displays the results of the experiments

Table 4: Experiments results

Ba	(F1) Acquaintan-ceship	(F2) Knowledge gap awareness	(F3) Awareness of Ba's importance for knowledge creation	Approaching 3rd Individual	Original Ba	Adapted
1	LOW	HIGH	HIGH	3rd Ind. C	Ind. 1 + Ind. 2 (S-Lab)	○
2	LOW	HIGH	LOW	3rd Ind. NG	Ind. 1 + Ind. 2 (E-Lab)	×
3	LOW	LOW	HIGH	3rd Ind. NK	Ind. 1 + Ind. 2 (I-Lab)	○
4	LOW	LOW	LOW	3rd Ind. NK	Ind. 1 + Ind. 2 (I-Lab)	×
5	HIGH	HIGH	HIGH	3rd Ind. NK	Ind. 1 + Ind. 2 (S-Lab)	○
6	HIGH	HIGH	LOW	3rd Ind. NI	Ind. 1 + Ind. 2 (E-Lab)	○
7	HIGH	LOW	HIGH	3rd Ind. NK	Ind. 1 + Ind. 2 (I-Lab)	△
8	HIGH	LOW	LOW	3rd Ind. C	Ind. 1 + Ind. 2 (I-Lab)	○

○ = Yes △ = Accepted 3rd individual, but not included in case-solving × = No

through adaptation assessment, where the first step in the analysis consisted of the consolidation of the scores of experiments based on the checklist.

All the experiments were analyzed and the observed checkpoints scored 1 (one). Points which we did not see throughout the that were not observed throughout the experiments scored 0 (zero). The last two checkpoints served as a summary of the experiment and what the ba looked like (adapted or not) before the third individual left the experiment.

Subsequently, we assigned a point scale to "adaptation," and "acceptance, but no participation in case solving" and "no adaptation" to measure the hypotheses testing results (Figure 8).

Bas that had adapted received a "+2" (plus two) points score. Bas that accepted the third individual, but she or he did not participate in the case solving process scored "0" (zero) point. Bas that did not adapt received a scored of "–2" (minus two) points.

We separated the scenarios for analysis and compared the results of experiments with factors scoring "low" with the ones scoring "high." All the "low" scores would pose more challenges to adaptation, in contrast to the "high" ones, considered there were more prone to adaptation.

Subsequently, we conducted an individual analysis of the tested hypotheses, and the points for each were summed to indicate whether it supported the hypotheses or not.

Once the points were summed up, their absolute value would be subtracted from one another to find the distance between the points. A hypothesis would be supported if the criteria of a minimum 5 (five) points distance between "low" and "high" scenarios were met, the calculation is illustrated in Figure 9.

Less than a 5 (five) points distance would not meet the criteria of support and the hypothesis would be considered as "not supported."

A minimum 5 (five) points distance result was chosen, in contrast to a smaller distance, to aid in the analysis and indicate a clear direct effect of the factors on ba's adaptation when they scored either low or high.

Hypothesis 1 *The original ba's acquaintanceship with the third individual directly affects ba's adaptation.*

Of the four bas where acquaintanceship scored

Table 5: Consolidation of experiments checklists and checkpoints

Factor		**Ba 1**	**Ba 2**	**Ba 3**	**Ba 4**	**Ba 5**	**Ba 6**	**Ba 7**	**Ba 8**
(F1) Acquaintanceship with thrid individual		***Low***	***Low***	***Low***	***Low***	***High***	***High***	***High***	***High***
(F2) Knowledge gaps awareness		***High***	***High***	***Low***	***Low***	***High***	***High***	***Low***	***Low***
(F3) Awareness of Ba's importance for knowledge creation		***High***	***Low***	***High***	***Low***	***High***	***Low***	***High***	***Low***
	Check points								
Attraction and Bonding (Braaten, 1991)	1. Original ba looked like third individual was important to the activity.	1	0	1	0	0	0	0	0
	2. Original ba seemed attracted to third individual.	0	0	0	0	0	1	0	1
	3. Original ba identifies itself with third individual reasonable similarities (e. g. of values, educational level, religion, philosophy of life etc.).	0	0	0	0	1	1	1	0
	4. Original ba showed admiration towards third	1	0	0	0	0	0	0	0
	5. Original ba seemed compatible with third individual.	1	0	1	0	1	1	1	0
	6. Original ba showed enthusiasm towards third	1	0	0	0	0	0	1	0
	7. Original ba showed excitement towards third	1	0	0	0	0	1	0	1
Support and Caring (Braaten, 1991)	8. Original ba showed to third individual his importance in solving the case.	0	0	1	0	0	0	0	1
	9. Original ba communicated to third individual his importance in solving the case.	0	0	0	0	0	0	0	0
	10. Original ba showed some kind of positive affection towards third individual.	1	1	1	1	1	1	1	1
	11. Original ba showed approval of third individual.	1	1	1	1	1	1	1	1
	12. Original ba communicated the approval of third individual.	0	0	0	0	0	0	0	0
	13. Original ba showed interest in third individuals	1	0	1	1	1	1	1	1
	14. Original ba showed trust in third individual.	1	0	1	0	1	0	1	1
	15. Original ba showed conviction about third individual's capabilities.	1	0	1	0	1	1	1	0
	16. Original ba communicated conviction about third individual's capabilities.	0	0	0	0	0	0	0	0
Listening and Empathy (Braaten, 1991)	17. Original ba listened to third individual's inputs.	1	0	1	1	1	1	1	1
	18. Original ba used third individual's input to solve the	1	0	1	1	1	0	0	1
	19. Original ba showed some kind of agreement with third individual's input.	1	0	1	1	1	1	1	1
	20. Original ba used their words carefully when responding third individual's input.	1	1	1	0	1	1	1	1
	21. Original ba seemed to try and work positively with third individual.	1	1	1	1	0	1	1	1
Self-disclosure and feedback (Braaten, 1991)	22. Original ba gave feedback to third individual's	1	0	1	0	0	1	1	1
	23. Original ba made friendly jokes with third	1	0	1	0	1	1	0	0
	24. Original ba seemed to be transparent towards third individual.	1	1	1	1	1	1	1	1
	25. Original ba seemed to feel comfortable with third individual.	1	0	0	0	1	1	1	1
	26. Original ba behaved spontaneously towards third individual.	1	1	0	0	1	1	1	1
	27. Original ba seemed excited during the whole	0	0	1	0	1	1	0	1
Process performance and Goal attainment (Braaten, 1991)	28. Original ba kept in mind they needed to solve the case.	1	1	1	1	1	1	1	1
	29. Original ba worked with the third individual to solve the case.	1	0	1	0	1	0	0	1
Observed behaviour (by researcher)	30. Original ba accepted the third individual into it solving the case.	**1**	**0**	**1**	**0**	**1**	**1**	**1**	**1**
	31. Adapted ba emerged and tried to solve the case.	**1**	**0**	**1**	**0**	**1**	**1**	**0**	**1**
	TOTAL	**24**	**7**	**21**	**9**	**20**	**21**	**18**	**21**
	ADAPTATION	◯	×	◯	×	◯	◯	△	◯

Symbol	Description	Points
◯	Adapted	+2
Δ	Accepted 3rd individual, but not included in case-solving	0
×	Did not adapt	-2

Figure 8: Points scale

Points Distance Calculation *(Absolute HIGH - Absolute LOW)*		
(F1) Acquaintanceship with thrid individual	(F2) Knowledge gaps awareness	(F3) Awareness of Ba's importance for knowledge creation
|HIGH| - |LOW|	|HIGH| - |LOW|	|HIGH| - |LOW|

Figure 9: Points Distance Calculation

Factor	LOW	LOW	LOW	LOW	HIGH	HIGH	HIGH	HIGH
(F1) Acquaintanceship with third individual	◯	×	◯	×	◯	◯	Δ	◯
Points	+2	-2	+2	-2	+2	+2	0	+2
Total	**0**				**6**			

Figure 10: Hypothesis 1 results

Factor	LOW	LOW	LOW	LOW	HIGH	HIGH	HIGH	HIGH
(F2) Knowledge gaps awareness	◯	×	Δ	◯	◯	◯	◯	×
Points	+2	-2	0	+2	+2	+2	+2	-2
Total (points)	**2**				**4**			

Figure 11: Hypothesis 2 results

Factor	LOW	LOW	LOW	LOW	HIGH	HIGH	HIGH	HIGH
(F3) Awareness of Ba's importance for knowledge creation	×	×	◯	◯	◯	◯	◯	Δ
Points	-2	-2	+2	+2	+2	+2	+2	0
Total (points)	**0**				**6**			

Figure 12: Hypothesis 3 results

◯	*= Adapted*
Δ	*= Accepted 3rd individual, but not included in case solving*
×	*= Did not adapt*

high, three were adapted. One of them effortlessly accepted the third individual, but she or he was not included in the case-solving activity, being only an observer, watching the original ba continue the task. When (F1) scored low, only two original bas adapted.

When F1 scored low, we could observe that something extra was needed for the original ba's adaptation, whereas when it scored high, acquaintanceship was powerful enough, showing that bas have a higher chance to adapt when individuals are well acquainted with one another.

Experiments with factor 1 scoring high had a total of +6 (plus six) points, whereas their more challenging counterpart had a total of 0 (zero) point.

The distance of points calculated was 6 (six). This met the study's criteria, so hypothesis 1 was supported.

Hypothesis 2 *The original ba's awareness of its existing knowledge gaps directly affects ba's adaptation.*

The adapted bas whose original ba scored high in (F2) knowledge gap awareness outnumbered the ones scoring low. Bas with knowledge gap awareness assessed their lack of capabilities to solve the case and looked outside their boundaries for skills to complete the task, welcoming any contribution for case solving and accepting the third individual as a participant in the knowledge-creating activity.

When factor 2 was high, experiments had a 2 (two) points distance when it scored low after we calculated the points distance.

A 2-points distance between high and low scenarios did not meet the criteria and hypothesis 2 was not supported.

Hypothesis 3 *The original ba's awareness of "ba's concept" importance for knowledge creation directly affects ba's adaptation.*

The original bas informed in (F3) the importance of the concept of ba for knowledge creation performed better and adapted. The adapted bas whose original ba scored high in F3 outnumbered the ones that scored low.

When F3 scored low, the results differed much more (two adapted bas versus two unadapted). When it scored high, the results were much more positive and, even though one of the bas did not involve the third individual in the case-solving activity, it did not have any issues in accepting its presence.

Experiments had a total of +6 (plus six) points where factor 3 scored high and had a total of 0 (zero) point when it scored low. After calculation, there was a 6 (six) points distance between the scenarios when factor 3 scored high and when it scored low. This met the criteria and hypothesis 3 was supported.

Figure 13 consolidates the points distance calculated for each hypothesis test results. Factors 1 and 3 created a 6 points distance between the scenarios where these factors scored high and low. Factor 2 generated a 2-points distance between the opposite score scenarios.

Based on the minimum 5 (five) points distance

Points Distance					
(F1) Acquaintanceship with thrid individual		(F2) Knowledge gaps awareness		(F3) Awareness of Ba's importance for knowledge creation	
LOW	HIGH	LOW	HIGH	LOW	HIGH
0	6	2	4	0	6
|HIGH| - |LOW| = |6| - |0| =		|HIGH| - |LOW| = |4| - |2| =		|HIGH| - |LOW| = |6| - |0| =	
6		2		6	

Figure 13: Points distance consolidated

Hypotheses	Description	Supported
H1	Original ba's acquaintanceship with the third individual directly affects ba's adaptation.	✓
H2	Original ba's awareness of its existing knowledge gaps directly affects ba's adaptation.	✗
H3	Original ba's awareness of "ba's concept" importance for knowledge creation directly affects ba's adaptation.	✓

Figure 14: Hypotheses test result summary

criteria set for hypothesis support, hypotheses 1 and 3 were supported. Hypothesis 2, on the other hand, was not supported. Figure 14 presents a summary of the test results.

Our research question was ***Being ba's adaptation the desired path when an original ba is approached by a third individual to become a participant and, from the ba standpoint, what are possible factors that can directly affect adaptation?***

Hypotheses 1 and 3 were supported and they tested the direct effect of factors 1 and 3, respectively, on ba's adaptation. Hypothesis 2 was not supported.

In the scenario of the study and based on the results presented, our answer to the research question is **factor 1** (F1) Original ba's acquaintanceship with the third individual—and **factor 3** (F3) Original ba's awareness of "ba's concept" importance for knowledge creation—can directly affect ba's adaptation.

DISCUSSION

The study focused on knowledge creation, and it aimed to explain some of the factors that could directly affect ba's adaptation when approached by

a third individual. Eight experiments were conducted to test the hypotheses with the factors scoring "low" and "high."

When the three studied factors scored low, it was considered more challenging for the bas to adapt. On the other hand, when they scored high, it was considered less challenging and the bas would be more prone to adaptation.

Through the analysis, we found that factors 1 (F1) and 3 (F3) directly affected the adaptation. Factor 2 (F2) did not directly affect adaptation.

Original ba's well acquainted with the third individuals had achieved a degree of intimacy with him/her through past interactions, which resulted in openness to share tacit and explicit knowledge, their knowledge bases, and the underlying values (Nonaka *et al*., 1998) and include them in the case-solving activity.

Acquaintanceship (F1) with a third individual, specifically when it scored high, was the support on which feelings of care, love, and trust existed (Nonaka *et al*., 1998) and worked as prebuilt platform where absorption occurred easily and, consequently, bas adapted.

Original ba's highly aware of the importance of ba's concept to knowledge creation (F3) adapted more. When acquaintanceship (F1) scored low, bas scoring high on F3 adapted more. This factor directly affected adaptation by working as its propeller under this circumstance.

Awareness of the importance of ba's concept for knowledge creation (F3) enabled participants of ba to self-transcend (Nonaka *et al*., 1998), which is essential for the knowledge creation process in the SECI model.

By enabling self-transcendence, it motivated "participants to come to appreciate the potential for transacting with others" (Huemer, Von Krogh & Roos, 1998) by reshaping and adjusting the structure of their network and processes.

No observed direct effect of awareness of knowledge gaps (F2) agrees with Chen and Lin's (2004) findings and the original bas simply carried on their activities after the approach by the third individual. However, the original bas showed any realization of whether their internal knowledge was sufficient or not, the environment perturbation did not trigger any change on this.

The results of the experiments were surprising and posed a question with regard to the points distance (see Figure 13).

Why did factors 1 and 3 create such a long distance of points from challenging conditions to less challenging conditions for ba's adaptation, whereas factor 2 created a short one?

Ba touches emotions, feelings, and it possesses a "here and now" nature that binds it to a point in time. The mental ba is fleeting, delicate, and it may be broken easily. Its participants erect a protective mental boundary to prevent it from cracking when environment perturbations occur, protect this tie, and preserve its context-relation. Acquaintanceship (F1) and awareness of ba's importance to knowledge creation (F3) worked to weaken the strength of erected protective mental boundary. The original ba became more permeable, allowing the third individual to flow into it, become a participant, share its context, and create knowledge (adapt). Factors 1 and 3 impacted the strength of the protective mental boundary, leading to adaptation and therefore the large points distance.

On the other hand, knowledge gap awareness (F2) did not have a sizable impact on the strength of the protective boundary, resulting in the low effect on ba's permeability and, therefore, the short distance of points.

In our study, we justified why ba's adaptation is the desired path when approached by a third individual. From the findings, we concluded that acquaintanceship (F1) and awareness of the importance of ba's concept to knowledge creation (F3) worked to weaken the protective mental boundary erected by original ba's participants so this new individual can flow into it, be absorbed by it, and become a participant in the knowledge-creating activity. To do so and based on the support for hypotheses 1 and 3, we discuss the implications to organizations with regards to factors 1 (F1) and 3 (F3).

IMPLICATIONS

The first implication concerns acquaintanceship (F1). Ba is a shared context and a shared space for emerging relationships (Nonaka and Konno, 1999), whether physical (e.g., facilities of an organization),

virtual (e.g., e-mail and online forums) or mental (e.g., a shared experience and mental models).

Organizations can act as ba enablers and, ultimately, ba creators can work to connect individuals through shared contexts and spaces to increase the level of acquaintanceship between peers through initiatives that can promote interactions and, ultimately, bind people together.

These initiatives should create a bond among participants. It can be a web forum or a social network (cyber ba) hosted by the organization and where people can mingle. There may be informal organization happy-hours or a friendly welcome lunch for the newcomer where employees have a chance to talk and to get to know each other (originating ba, dialoguing ba). They can also be communities of practice or communities of hobbies where individuals get to share, exercise, and learn skills (exercising ba) from others who possess them. Acquaintanceship triggers care, love, and trust, which are crucial for knowledge creation (Nonaka *et al*., 1998).

The second implication concerns the awareness of the importance of ba's concept to knowledge creation (F3). Nurturing an organization environment where individuals are able to and feel compelled to transcend the self and "come to appreciate the potential for transacting with others" (Huemer *et al*., 1998) will promote openness, facilitating the flow of people of different skills and backgrounds into multiple bas more naturally, potentiating their absorption and participation in knowledge-creating activities.

The two implications are interwoven and initiatives to apply both in practice complement one another. Knowledge creation is hardly a rational and organized process, but organizations can foster an environment where it exists more naturally and individuals contribute to it. In the scenario studied, promotion of acquaintanceship among peers and self-transcendence impacted on bas' protective mental boundary strength by weakening it, and we saw new people flowing into bas, participating in them, and, consequently, creating knowledge.

LIMITATIONS AND FUTURE RESEARCH

Despite the findings and implications of the study, it is relevant to mention its limitations so that future studies can address them.

The researchers acknowledge the small number of experiments in this study and, due to the sample size, results did not pass through the rigidness of statistical analysis.

We experimented with the smallest possible ba structure (two individuals). It may be interesting to see how larger-sized bas behave and explain that factors that directly affect their adaptation. Moreover, the study was restricted to factors of original ba standpoint, it is likely that factors concerning third individuals are relevant and demand further investigation.

All experiments took place in a school environment and, although competition among students does exist, it may be shaped differently in work environment. In addition, these participants were from different nationalities, but cultural factors were not included in the analysis.

These limitations may be addressed in future studies for a deeper understanding of the effect that an approaching third individual has on ba. Future studies could clarify more factors from a ba standpoint along with factors related to the third individual, and, if possible, try to find their relations and the effect on ba's adaptation. Ba being the foundation for knowledge creation, it is relevant to understand its behavior so organizations can make use of the concept more effectively.

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