DIGITAL PROXEMICS APPROACH IN CYBER SPACE ANALYSIS – A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT. *The evolution of cybercrime has various types and dimensions, and sometimes it is complicated to be resolved by law enforcement agency in Indonesia. On the other hand, the public oftentimes is surprised to get their position as a victim in doing something that is common in cyber space. Discrepancy between public perspective and law perspective created tension between the public and law enforcement. Gap of understanding within cyber space concept is because sometimes the law is difficult to catch the dynamic phenomenon in cyber space that shifts in very fast way with many convergence concepts. By the convergency principle in cyber space, this paper tries to discuss from the science of communication. In digital media, communication role is very important, because in cyber space of the backbone concept is communication, and one of the concepts of digital communication is digital proxemics that will be explored with literature review method. This paper found that proxemics concept can determine the scope of personal data protection from privacy and the distribution of information.*
Keywords: Digital proxemics, Digital communication, Digital media, Cyber space, Cybercrime, Cyber law

1. **Introduction.** Cybercrime cases happen every day in our lifetime, and oftentimes arise from people activity in cyber space [1]. Cybercrime activities may impact many aspects in our daily life [2]. Many papers discuss it from technical computer analysis. Li et al. discuss specifically on technical aspect of cyber-attack and detection [3]. There are also some papers that analyze from legal viewpoint [4], but there are fewer papers that discuss cybercrime or cyber-attack from the communication perspective and even fewer discuss it from three perspectives namely: legal science, computer science and communication science.

In practice, commonly law enforcement in cyber space in many countries used normative approaches, and these approaches were sometimes considered as repressive law. On the other hand, law enforcers occasionally have difficulty in ensnaring perpetrators of crime in cyber space because cyber law has not been able to reach all of legal actions in cyber space. There is also missing perception about the concept of space in digital world, which belongs to person in private or public. Defining public in private space is fundamentally important, because in the law concept they are "public" concept, and they are also different legal consequences. That is why in public space people have to consider their opinion before they posted into public to avoid any lawsuit [5].

This paper tried to propose a perspective about public and private in cyber space, the perspective becomes important because nowadays in cyber space commonly create new media and new concept because of the convergence communication channel. To explain

this concept, this paper will explain the proxemic concept and the Laswell Communication Model as a basic concept in communication. The next explanation is about the concept of digital proxemics by using literature studies. In the final section, it will be explained about the convergence of communication science, legal science and information technology-based media using digital proxemics approaches. This chapter will conclude with the use of the concept of digital proxemics in the example of handling cybercrime.

2. Literature Review.

2.1. **Definition of proxemics.** In a real-world regarding space, human will need public and private space to deliver information. The question raised for public space and private space is on how the law views the two spaces, because different space will have different legal consequences. Edward T. Hall presented proxemics as a hypothesis for contemplating the relational spatial connections between people [6]. His hypothesis, by and large, portrays how individuals see, decipher, and (regularly unwittingly) utilize the micro space around them, and how this influences their association and correspondence with another close by individuals; however, he likewise referred to that culture and starting point of the nation will contrast starting with one then onto the next.

   Hall describes how individuals decipher and use proxemic signs, particularly separation, to intervene in relations with others. Specifically, he connects physical separation to social separation between individuals. As appearing in Figure 1, Hall classifies space into 4 territories: intimate (0-50 cm), individual (0.5-1 m), social (1-4 m), and public (4 m or more). These aggregate separations, which Hall calls the dynamic space, portray a movement of connections going from profoundly close to close to home to social to open. The specific scopes of these relational separation zones depend on social factors as well as on different factors, for example, age, sexual orientation, or individual relationship.
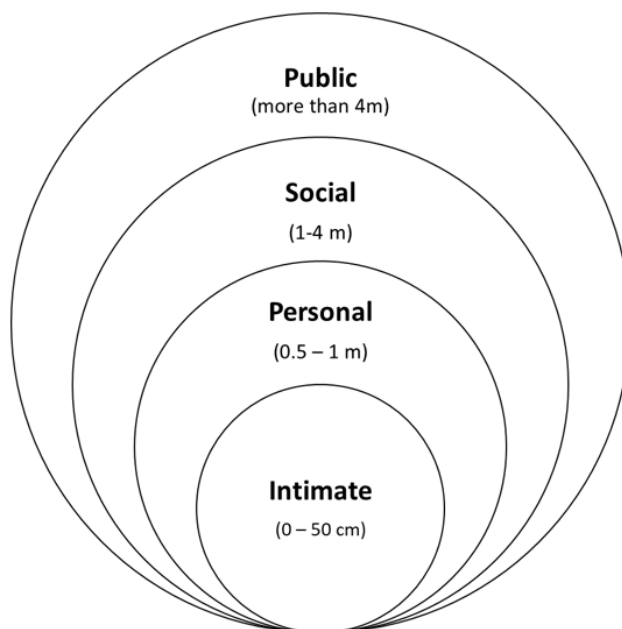

FIGURE 1. Hall's proxemics zone [6]

2.2. **Digital proxemics.** By using references from Hall's Proxemics Theory, it should be possible to create a definition of cyber space. The definition of cyber space is important because in private space, and sharing information cannot be classified as distributed information to the public. For example, if someone insults another person in an intimate area such as murmuring or talking to themselves about someone or cursing that person

with a low murmur, then it cannot be included in defamation, because the law requires defamation to be done in public spaces.

Hall's concept is very useful when classifying legal action and for legal argumentation in the court. What needs to be completed from Hall's proxemics concept are other variables that can define the concept of proxemics in cyber space, because the main variable of Hall's proxemics is distance. Distance in cyber space is an unknown concept. A person can be physically apart on another continent but engage in intimate conversations on social media. Therefore, it is necessary to know what variables can complement the distance variable in Hall's concept of proxemics into the concept of digital proxemics.

3. **Research Method.** This paper is using a systematic literature review to admit a scientific method the concept of digital proxemics from previous research and identify factors of digital proxemics in relation to cybercrime, cyber law, and cyber space.

3.1. **Search process.** The research is sharping academic database that consists of academic journal and conference paper based on research question what is digital proxemics and identifies the neighboring factor in relation to cybercrime, cyber law and cyber space from various scientific web directory as follows:

1) Scopus.com,
2) ACM digital library,
3) Proquest.com,
4) Science Direct.com.

In this paper, candidate study targeting critical factor in digital proxemic. The keywords search strings are proxemic, digital, law, cyber, space, Internet, digital proxemics, cyber law, cybercrime, and cyber space. The keywords combination is as defined below:

- Proxemic* AND (digital OR Internet OR cyber OR app*)
- Proxemic* AND space AND (digital OR cyber OR Internet)
- Proxemic* AND law
- Proxemic* AND crime
- Proxemic* AND space

3.2. **Inclusion and extraction.** Data extraction is part of reshaping the search process, to emphasize the inclusion criteria, secondly candidate study should be aware of the scientific keyword comply with focus research question based on paper published from year 2011 to 2020, manuscript, book chapters, journal, proceedings encounter that manuscript come from point source correlates specifically keywords defined as studies found. In addition, to clarify the validity literature review, the exclusion criteria of searching term are defined into some procedure such as the following:

- Published before 2011
- Uncomplete paper
- Duplication of data extraction has been excluded
- Deep technical issue
- Government regulation

3.3. **Data extraction.** During this process, the data found search term will be extracted based on three data collection which are:

- Study found: the paper found is matched with search keywords
- Candidate study: the paper keywords is matched with title and abstract
- Selected study: the paper will be analyzed and read carefully from abstract, introduction to conclusion to help answer the research question.
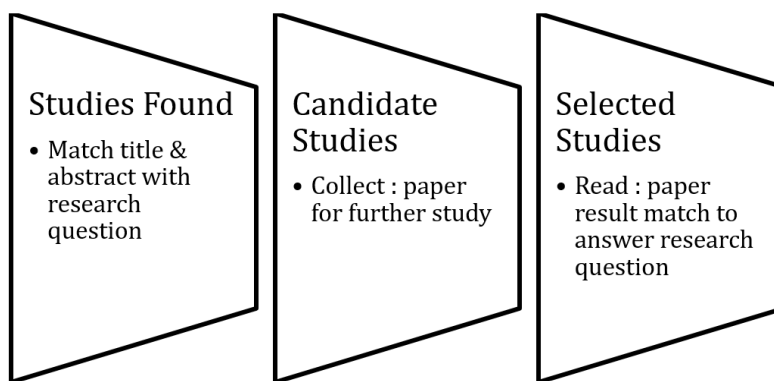
FIGURE 2. Data extraction process

As shown in Table 1, there were 438 papers analyzed by candidate study limited it into the similarities approximately come up with 51 papers, in order to follow the systematic literature review theory, the subject and abstract to meet the research question. The 25 of final papers reprocess shown in Table 1.

TABLE 1. Data extraction

Source	Found	Candidate	Selected
Scopus	200	21	15
ACM Digital Lib.	138	15	5
Science Direct	60	10	3
ProQuest	40	5	2
Total	438	51	25

4. Result and Discussion.

4.1. **Result.** The goal of systematic literature review is to seek an article to review, read by candidate study in order to follow systematic literature theory [7]. From this systematic literature review it is found factors in digital proxemics are: distance, orientation, movement, identity, location [6]; pseudonym as private sphere [8]; spatial; role; fidelity; control [9]; proxemic interaction [10]; sound as stimulation to proxemics behavior [11]; role of familiarity for feedback [12]; distance, pose, orientation [13]; location, distance, motion, orientation, custom [14]; gaze, proxemic imaging [15]; orientation, distance, motion, identity, location, proximity toolkit [16]; proxemic transition, transition speed, stepwise reconfiguration, radical shifts [17]; control proxemics, deixis proxemics, perceptual proxemics [18]; disclosure boundary, identity boundary, temporal boundary [19], avatar gaze, avatar facial expression, avatar body posture, avatar gesture, avatar space [20]; rule [21]; reinforcement learning [22]; mood [23]; facial, vocal emotion, internal noise level, physical appearance [24]; density stress [25]; child proxemics depend on peer and parents [26]; ethnic appearance [27]; face distance [28]; group behavior [29]; level of attention, content speed, user shadow contrast, scale [30]; display space, interaction space, potential interaction space, gap space, social interaction space, comfort space, activation space [31].

4.2. **Discussion.** From the findings of digital proxemics factors above, the research team then tried to sort out which factors are important in determining digital proxemics and make modeling to facilitate the analysis of digital proxemics and their relationship with the determination of cyber space. To accommodate the communication science environment, digital proxemics factors that represent the Laswell Communication Model are

selected: communicator, message, medium, audience and effects [32]. There are four digital proxemics factors that are taken from previous systematic literature review to be analyzed [16]: (person) identity, (content) movement, (cyber) space, and role (of person and content) [9].

a) Identity

What is meant by identity here is the identity of the person, both the communicator and the audience. The scope of identity that will be discussed mainly is digital identity. There are ten components of digital identity that need to be considered in digital proxemics analysis, namely [33]:

- *Identifier*, differentiation of specific person. For example, in Twitter account, a person can have "@account name" for account identifier. One person can have multiple account identifier in several social media. Along these lines, every identifier can sensibly be thought of as having a <person identified; identifier; media space> set, e.g., <celebrity name; personal account, business account; Twitter, Instagram>.
- *Attribute*, a characteristic related with a person. Example of persistent attribute is blood type and example of temporary attribute is hair color.
- *Personal identifier*, a set of identifiers based on an attribute associated with a person. Example is Bob Marley' hair which in turn is a model of specific hair styles for specific music genre.
- *Identification*, the relation of a personal identifier with an individual's attribute. Example is people calling a student, "You are Jane Doe" because of her face and hair style.
- *Authentication*, evidence of an attribute. Example is geo location tagging in Google Map of a business location.
- *Identity authentication*, proof of an association between identifier and a person. Example is a connection between student with school grade on diploma certificate. Note that, "You are Jane Doe" is identification while "Your diploma certificate showing that you are Jane Doe" is identity authentication.
- *Attribute authentication*, confirmation of an association between person and an attribute. In an identity system this is usually a two-level process: identity authentication followed by identification. Notice the difference between "Your diploma certificate showing that you are Jane Doe" which is identity authentication and "Your document showing that you are Jane Doe, an alumnae of this university and because your face and finger print match your database, therefore you entitle to certain discount in campus cafeteria" which is an attribute authentication.
- *Authorization*, an arrangement to allow particular action based on identifier or attribute, for example, the ability of alumnae to borrow book in university library with half the price of public visitor.
- *Anonym*, an authenticated attribute that is not related to an identifier, e.g., cash money holder is example of anonym identifier. Identification of cash money holder depends on physical money that is present at the time of transaction.
- *Pseudonym*, an identifier associated with attributes but with no permanent identifier.

b) Movement

In cyber space, content can be considered as a person representative. This is because if the content appears to be authentic and someone can be ascertained with their identity, then the content represents personal opinion and personal identity. Therefore, content movement represents person movement in digital proxemics. Content movement is a motion consisting of change of orientation and distance that travels through cyber space over time [6]. There are two variables related in content movement that can be associated with digital proxemics [16]:

- *Direction*, information of how the content travels. Content can be travelled from a person to person or person to public. Content also travels through cyber space and passing boundary.
- *Orientation* provides information on which direction the content is facing. Content can be intentionally directed to the person. Content can also be inadvertently accepted by the public even though the actual content owner does not intend to do so, or content can also consume by content owner and not intend to be shared to anyone.

c) Space

Cyber space is a medium where content moves from one place to another, from one person to another, or from one person to the public. Variables in cyber space are:

- *Location* is a division of space within specific boundary. By location, space can be divided into [31]:
  - *Comfort space* is where person can feel safe and protected by several boundary. Example in social media is whether you choose your profile can be seen by others, friend or invisible.
  - *Gap space* are spaces that create distance with others or with system. Example in online forum there are several threads with different level of permission.
  - *Display space* are the areas where content can be seen. Example is content in social media post.
  - *Activation space* are spaces where some content can be seen but engagement is limited. Example is protected social media posting where comment section is not active.
  - *Potential interaction space* is the area where engagement between person can probably exist.
  - *Interaction space* are spaces used to actualize a form of communication between person, either one way, two way, one to many or many to many.
  - *Social interaction space* are spaces where engagement happens.
- *Boundary* is limitation of area by a certain rules and tools to restrict information from flowing with content. There are three types of boundary [19]:
  - *Disclosure boundary* is boundary that separates what you share to other and what you keep to yourself. Example is posting opinion in social media when you can choose between sharing it to public, friend or yourself.
  - *Identity boundary* is the boundary of different roles we have in our society. For example, someone who have roles as a family member, duty as an officer in police force and volunteering in community development. For every role that she performed, there are different kinds of information that she can share or cannot.
  - *Temporal boundary* is information control over time. Example is knowing you visit a general practitioner in a hospital versus knowing your entire medical record in that hospital.

d) Role

Role is the interaction and behavior shown by the person and content in their interactions in cyber space. There are three types of role related to digital proxemics [18]:

- *Control proxemics* are intended interaction between person in cyber space.
- *Perceptual proxemics* are perception received by a person resulting from the content received.
- *Deixis proxemics* are explanation within interaction in proxemics boundaries.

5. **Conclusion.** Systematic literature review research can generate the common factors that mention in previous research about digital proxemics related to cyber space analysis

which are person identity, content-movement, cyber space and role of person and content. Some of proxemics concept is also useful to identify personal data, especially from the concept of identity, movement and space. The future research that needs to conduct is to determine the depth factor that contributes to law enforcement in cyber space. Modelling of digital proxemics rules in cyber space analysis and what digital proxemic can do in helping law enforcement to analyze rules and engagement that is very important for the law concept in order to create regulation regarding personal data protection and distribution of information.

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