Al Qalam: Jurnal Ilmiah Keagamaan dan Kemasyarakatan
https://jurnal.stiq-amuntai.ac.id/index.php/al-qalam
P-ISSN: 1907-4174; E-ISSN: 2621-0681
DOI : 10.35931/aq.v20i2.5337

EMOTIONAL RESPONSES AND COMPREHENSION IN ASYNCHRONOUS COMMUNICATION: A LITERATURE REVIEW OF CHANGING DIGITAL INTERACTION PATTERNS

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Abstract

The advancement of digital technology has shifted human communication patterns from synchronous to asynchronous modes. This study aims to describe the characteristics of asynchronous communication, analyze its impact on message comprehension, and explain how it influences users' emotional responses. Using a qualitative descriptive approach based on a literature study, this research reviews relevant works in digital communication, cognitive psychology, and emotional response theories. Findings indicate that asynchronous communication offers advantages in time flexibility and message processing, but also presents challenges such as limited emotional cues and potential misunderstandings. Message comprehension is closely tied to an individual's cognitive capacity, while emotional responses are more filtered yet susceptible to emotional detachment. This study contributes theoretically by linking cognitive and affective aspects in digital communication and offers practical insights for developing more empathetic communication strategies in the digital era.
Keywords: Asynchronous Communication, Message Comprehension, Emotional Response, Digital Interaction, Cognitive Psychology

Abstrak

Perkembangan teknologi digital telah mengubah pola komunikasi manusia dari yang bersifat sinkron menuju komunikasi asinkron. Studi ini bertujuan untuk mendeskripsikan karakteristik komunikasi asinkron, menganalisis dampaknya terhadap pemahaman pesan, serta menjelaskan bagaimana komunikasi ini memengaruhi respons emosional pengguna. Penelitian ini menggunakan pendekatan deskriptif kualitatif berbasis studi pustaka, dengan menganalisis literatur terkait komunikasi digital, psikologi kognitif, dan psikologi emosional. Hasil kajian menunjukkan bahwa komunikasi asinkron memiliki kelebihan dalam fleksibilitas waktu dan pengolahan pesan, namun juga menimbulkan tantangan berupa keterbatasan isyarat emosional dan potensi miskomunikasi. Proses pemahaman pesan sangat dipengaruhi oleh kemampuan kognitif individu, sedangkan respons emosional pengguna cenderung lebih terkontrol namun juga rawan keterasingan emosional. Temuan ini memberikan kontribusi teoretis dalam menghubungkan aspek kognitif dan afektif dalam komunikasi digital serta menawarkan rekomendasi praktis bagi pengembangan strategi komunikasi yang lebih empatik di era digital.
Kata Kunci: Komunikasi Asinkron, Pemahaman Pesan, Respons Emosional, Interaksi Digital, Psikologi Kognitif

INTRODUCTION

The development of communication technology has drastically changed the way humans interact in everyday life. The emergence of various digital platforms such as email, instant messaging applications, online forums, and even e-learning systems allows communication to take place not only synchronously (immediate and real-time) but also asynchronously (delayed or not real-time). Asynchronous communication has become one of the dominant communication models in the digital era, particularly in the context of remote working, online learning (e-learning), and virtual social interactions.[1] Ease of access to information and flexibility of time are the main reasons why asynchronous communication is so popular in modern life.[2]

However, this change in the form of communication not only impacts the technical side, but also has significant psychological consequences on how individuals understand messages and respond to them emotionally.[3] Unlike synchronous communication, which allows for immediate verbal and nonverbal expression, asynchronous communication often involves time lags, limited emotional cues, and the potential for misunderstandings. Phenomena such as delayed responses to messages, ambiguous interpretations of texts, and overthinking the sender's intent are among the psychological challenges that arise in asynchronous communication. Therefore, it is important to understand how these communication dynamics impact an individual's cognitive and affective aspects.[4]

In the context of message comprehension, cognitive psychology theory suggests that information processing is heavily influenced by context, the order in which messages are delivered, and the presence of additional cues such as facial expressions or intonation. In asynchronous communication, these elements are often absent or replaced by symbols like emoticons and punctuation. This can lead to a greater cognitive load in the message decoding process, opening up the opportunity for miscommunication.[5] Meanwhile, from the emotional

[1] Andrew Gambino et al., "Building a Stronger CASA: Extending the Computers Are Social Actors Paradigm," *Human-Machine Communication* 1 (February 2020): 71–86, https://doi.org/10.30658/hmc.1.5.

[2] Joseph Grech, "Social Presence and Satisfaction in Asynchronous Text-Based Communications in Online Nursing Education: A Comparison With Synchronous Video Communications," *Nursing Education Perspectives* 43, no. 3 (2022), https://doi.org/10.1097/01.NEP.0000000000000915.

[3] Andy J. Saltarelli and Cary J. Roseth, "Effects of Synchronicity and Belongingness on Face-to-Face and Computer-Mediated Constructive Controversy.," *Journal of Educational Psychology* 106, no. 4 (2014): 946–60, https://doi.org/10.1037/a0036898.

[4] Majid Zeinali Nejad et al., "The Effect of Synchronous and Asynchronous Computer-Mediated Communication (CMC) on Learners' Pronunciation Achievement," *Cogent Psychology* 8, no. 1 (2021): 1872908, https://doi.org/10.1080/23311908.2021.1872908.

[5] Lang Lin et al., "Asynchronous Secure Communication Scheme Using a New Modulation of Message on Optical Chaos," *Optical and Quantum Electronics* 55, no. 1 (2023): 15, https://doi.org/10.1007/s11082-022-04238-x.

response side, individuals may over-respond to certain messages due to subjective interpretations, especially when there is a delay or no response from the other person.[6]

Several previous studies have addressed the topic of online communication, but most have focused on the technological aspects or efficiency of communication, without delving deeply into the psychological impact of this delayed form of communication. This study aims to fill this gap by focusing on two key aspects: how asynchronous communication affects message comprehension and how this form of communication shapes individuals' emotional responses in their digital lives.[7] This research uses a library research approach, by referring to various journals and previous relevant research in the fields of digital communication, cognitive psychology, and social psychology.[8]

By understanding these dynamics, it is hoped that this research can provide conceptual contributions to the development of digital communication theory and provide practical input in increasing the effectiveness of asynchronous interactions, especially in the world of education, work, and digital social life. Amidst the increasing dependence on communication technology, knowledge regarding the psychological aspects of asynchronous communication is becoming increasingly important to be studied critically and systematically. Top of Form Bottom of Form

Theoretical basis

Media Synchronicity Theory

Media Synchronicity Theory, Dennis & Valacich explains that communication effectiveness is highly dependent on the appropriateness of the medium to the type of communication task. Communication media are divided into two: synchronous (immediate) and asynchronous (delayed). Asynchronous communication is characterized by delays in message delivery, making it more effective for conveying new information (conveyance) but less optimal for achieving shared understanding (convergence). The limited direct feedback and social signals in asynchronous communication lead to the potential for miscommunication and misunderstanding, which impact the quality of interaction and user emotional responses.[9]

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[6] Kathleen L. Mosier and Ute M. Fischer, "Meeting the Challenge of Transmission Delay: Communication Protocols for Space Operations," *Human Factors: The Journal of the Human Factors and Ergonomics Society* 65, no. 6 (2023): 1235–50, https://doi.org/10.1177/00187208211047085.

[7] Rima Al Tawil, "Nonverbal Communication in Text-Based, Asynchronous Online Education," *The International Review of Research in Open and Distributed Learning* 20, no. 1 (2019), https://doi.org/10.19173/irrodl.v20i1.3705.

[8] Suzannah Ogwu et al., "An Exploratory Study of the Application of Mindsight in Email Communication," *Heliyon* 6, no. 7 (2020): e04305, https://doi.org/10.1016/j.heliyon.2020.e04305.

[9] Jaebong Son et al., "Content Features of Tweets for Effective Communication during Disasters: A Media Synchronicity Theory Perspective," *International Journal of Information Management* 45 (April 2019): 56–68, https://doi.org/10.1016/j.ijinfomgt.2018.10.012.

Cognitive Theory of Information Processing

Cognitive information processing theory views communication as a mental process involving encoding, storing, and decoding messages. Asynchronous communication creates a greater cognitive load due to the absence of nonverbal cues that typically aid in interpreting a message's meaning. This cognitive load increases the risk of misperception and misunderstanding, especially when there is a delay in receiving a response. The complex information processing involved in asynchronous communication impacts overall message comprehension.[10]

Emotional Response Theory in Online Communication

In online communication, especially asynchronous communication, the limited availability of nonverbal signals creates challenges in expressing and understanding emotions. Emotional expressions rely on symbols such as emojis and punctuation, which can lead to emotional misinterpretations. Delays in message replies can also trigger negative emotional responses such as anxiety and frustration. Consequently, asynchronous communication impacts users' emotional dynamics and the quality of social interactions in the digital world.[11]

RESEARCH METHODS

This research uses a qualitative descriptive approach, aiming to provide a detailed and in-depth description of the forms, characteristics, and impacts of asynchronous communication in today's digital interactions. A qualitative approach was chosen because it allows researchers to understand the phenomenon contextually, explore the experiences and meanings inherent in asynchronous communication, and explore psychological and emotional aspects that are difficult to measure quantitatively.[12]

The data sources for this study were secondary literature relevant to the topics of asynchronous communication, cognitive psychology, digital communication, and user emotional responses. Data were collected through a literature review from various sources, including books, scientific journal articles, theses, and online publications with verified credibility. A purposive sampling approach was applied in the literature selection to ensure the data used was relevant and of good quality to support the research objectives.[13]

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[10] Brayadi Brayadi et al., "Information Processing And Cognitive Theories Of Learning," *Ej* 4, no. 2 (2022): 347–55, https://doi.org/10.37092/ej.v4i2.363.

[11] Xin Chen and Zhen-feng Cheng, "The Impact of Environment-Friendly Short Videos on Consumers' Low-Carbon Tourism Behavioral Intention: A Communicative Ecology Theory Perspective," *Frontiers in Psychology* 14 (February 2023): 1137716, https://doi.org/10.3389/fpsyg.2023.1137716.

[12] Charles Crook, "Computers in the Community of Classrooms," in *Learning with Computers* (Routledge, 1999).

[13] Eni Kustanti, "Nilai Tambah Koleksi Digital Literatur Sekunder," in *Media Pustakawan*, vol. 23, no. 1, preprint, 2016.

The data collection process involved identifying and selecting literature specifically addressing asynchronous communication, including various commonly used digital media and platforms. Furthermore, literature addressing cognitive psychology theories related to message comprehension and the impact of digital communication was also a primary focus. Researchers recorded and organized data based on relevant themes to facilitate the analysis phase.[14] For data analysis, this study employed thematic analysis. This method assists researchers in grouping data into key themes that emerge from the reviewed literature. The analysis phase begins with a thorough reading of all literature sources, followed by coding relevant data fragments. These codes are then classified into broad themes that describe the form of asynchronous communication, the psychological impact on message comprehension, and user emotional responses. This thematic analysis enables researchers to discover meaningful patterns and construct systematic and comprehensive descriptions.[15]

The results of this qualitative descriptive method are expected to provide a clear picture of how asynchronous communication operates in digital interactions and how it impacts users' psychological and emotional responses. These findings are also expected to form the basis for recommendations for developing more effective and humane digital communication strategies.

RESULTS AND DISCUSSION

Asynchronous communication is an increasingly dominant form of digital interaction in modern life, characterized by the use of media such as email, instant messaging, forums, and comment features that do not require real-time engagement between the sender and recipient of the message.[16] Based on a literature review, asynchronous communication is characterized by a time lag between sending and receiving messages, flexibility in responding, and a more static communication structure than synchronous communication. This form of communication provides users with the freedom to think, process information, and respond to messages in a more controlled manner. In practice, asynchronous communication also allows for more permanent

[14] Christian M. Wrang et al., "The Missing Children: A Systematic Scoping Review on Talent Identification and Selection in Football (Soccer)," *European Journal for Sport and Society* 19, no. 2 (2022), https://doi.org/10.1080/16138171.2021.1916224.

[15] Hanan Khalil and Martin Ebner, "Using Electronic Communication Tools in Online Group Activities to Develop Collaborative Learning Skills," *Universal Journal of Educational Research* 5, no. 4 (2017), https://doi.org/10.13189/ujer.2017.050401.

[16] Andrew Feenberg, "The Written World: On the Theory and Practice of Computer Conferencing Andrew," in *Mindweave: Communication, Computers and Distance Education.*, preprint, 1989.

documentation of conversations, allowing for message retrieval, evaluation, and reflection on the content of the communication.[17]

From a cognitive psychology and communication perspective, asynchronous communication has significant implications for how individuals process and understand messages.[18] Research has found that this time lag in communication can improve message comprehension because it gives the recipient time to more deeply process the information. However, on the other hand, the absence of nonverbal cues in asynchronous communication can lead to ambiguity. Individuals tend to interpret messages based on their own cognitive frameworks, which sometimes leads to miscommunication. From a cognitive psychology perspective, the process of decoding messages in asynchronous communication is highly dependent on digital literacy skills, attentional capacity, and working memory. This means that the better a person's cognitive capacity, the more effectively they will understand asynchronous messages.[19]

Here are some examples of asynchronous communication, namely:

1. Pedagogical Dimension

   That is, the level of asynchronous interaction and participation, when the asynchronous communication environment common in computer conferencing systems is adopted for networked collaborative interaction, one result is more evenly distributed communication. In traditional classrooms, the teacher monopolizes communication time. If and when discussions occur, they are often dominated by a small number of students, while the "silent majority" (the reflective, the shy, those who have difficulty following) tend to remain silent.

   In NCL courses, a much higher proportion of students have the opportunity to participate in discussions, and contributions within the group are more evenly distributed. However, it should be noted that asynchronous interaction results in longer communication times and is therefore not suitable for activities that require rapid action, such as making quick group decisions. In these cases, synchronous communication tools such as voice/text chat, video, or even online whiteboards are better options. This can also be used effectively for student-teacher interactions: students can be explained more quickly and clearly than with text-based interactions in forums.

[17] Fenne Verhoeven et al., "Asynchronous and Synchronous Teleconsultation for Diabetes Care: A Systematic Literature Review," in *Journal of Diabetes Science and Technology*, vol. 4, no. 3, preprint, 2010, https://doi.org/10.1177/193229681000400323.

[18] Khalil and Ebner, "Using Electronic Communication Tools in Online Group Activities to Develop Collaborative Learning Skills."

[19] Crook, "Computers in the Community of Classrooms."

2. Internet-based education

It is the ability, or in particular, the ability to learn, a feature or characteristic of curriculum and software specifically designed to enable certain types of actions. A communication style that does not require participants to be simultaneously engaged in dialogue, that is, participants can engage whether or not they are present at a given time. Postal and email communication are two examples of asynchronous communication.

3. Wide Area Network

Asynchronous communication refers to a form of interaction in which participants engage in discussion or collaboration without the need for real-time communication. This allows for more equitable participation among students than in a traditional classroom setting.

Synchronous communication is a bit stream with a fixed delay and a certain error rate. Dynamic information such as audio and video can be transmitted as a bit stream. In asynchronous communication services, the bit stream to be transferred is divided into packets. Packets are received by the destination with varying delays, and some of them may not be received correctly. Asynchronous services are therefore evaluated based on their quality of service, such as packet error rate, delay, and throughput. Static information such as data and images are organized into bit streams, usually transmitted in packets, and are more error-sensitive and delay-insensitive than dynamic information.

There are two classes of asynchronous communication services: connection-oriented and connectionless. Connection-oriented services send packets sequentially, in the correct order, and confirm delivery. Connectionless services send packets individually, out of order, and some packets may be lost.

Stream-oriented applications such as audio and video transmission require synchronous communication services. Interactive applications that require dialogue between remote machines typically use connection-oriented services. Delay-insensitive applications such as news distribution and email applications can use connectionless services.

4. Voice communication

Synchronous and Asynchronous Voice Communication IA, telephone Synchronous communication occurs when a sender and a receiver communicate in both directions at the same time. This is in contrast to asynchronous communication where a message is sent in one time period and received in another time period, as is typical of e-mail or letters sent by regular mail. Both modes of communication are available for one-to-one, one-to-many, and many-to-many voice communication facilitated by a variety of

technologies including traditional telephones, cellular telephones, radio broadcasts, two-way radios, voice mail, conference calls, and e-mail attachments of sound files.

5. Digital services in healthcare and social welfare

   Synchronous and asynchronous communication are the most widely used digital services in healthcare. With the advancement of wearable technology, remote monitoring has become possible. The results of this review are similar to the pre-pandemic comprehensive review, although remote monitoring is defined as asynchronous data transmission from a device, with separate storage and forwarding services defining patient data transmission.

6. An overview of technology and learning

   Devices are used to register responses as part of a class response system. One of them is:

   a. Immersive environment

      A computer-generated scene or world that gives the user the sensation of being inside the scene, rather than outside it.

   b. Information and communication technology

      A general term that covers computer hardware and software and their applications.

   c. Instructional management software

      A system that manages the collection, processing, and display of student data from computer-based instruction.

   d. Online learning

      Learning that occurs via the Internet.

   e. Open source

      A computer program whose source code is made available for free use and modification by others.

   f. Podcast

      Digital media files (either audio or video) distributed over the Internet for downloading and playback on mobile devices or personal computers.

   g. Recommendation system

      Software that uses information about users, together with data about the opinions and choices of all system users, to identify and present items or products that might interest the user.

   h. Response system

Hardware and software that allows class members or an audience to respond to questions from an instructor or presenter simultaneously, receiving a tabulation or other representation of the aggregate responses.

Websites that support the building of online communities by asking users to post public or semi-public representations of themselves and indicate other users about whom they wish to share information; examples include Facebook, Twitter, and MySpace.

i. Synchronous communication system

A system where all users log in at the same time; examples include video conferencing, internet telephony, and instant messaging.

j. Virtual manipulative

A software representation of a thing or system that a user can interact with.

7. Virtual learning system

A mode of communication in which messages are not coordinated in time and are sent at different clock rates.

a. Cognitive learning theory

A theory that views learning as a process of acquiring knowledge and changes in a person's knowledge structure that increase his or her potential for effective performance.

b. Cognitive structure

A person's internal memory and representation of knowledge. Sometimes also referred to as a mental model.

c. Constructivist pedagogy

An educational method that emphasizes the importance of active student involvement in developing understanding and knowledge.

d. Group Software

A software system designed to enable individuals and groups to communicate and interact to share knowledge and information.

e. Hypertext

Units of information are interrelated based on predetermined associations.

f. Synchronous communication (or interaction)

A mode of communication in which messages are coordinated in time and sent at the same clock rate.

g. Video conference

A direct communication link between two or more locations involving the exchange of audio, video, and textual information.

h. Video disc

Optical discs used for video storage and retrieval.

Many users report feeling more emotionally secure when interacting asynchronously due to the control over the timing and content of responses. However, this phenomenon also poses the risk of emotional isolation and limited empathy due to delayed or even absent responses.[20] Asynchronous communication also significantly influences the formation and emotional responses of users. Unlike synchronous communication, which allows for spontaneous expression and immediate emotional responses, asynchronous communication makes emotions more filtered. In the context of interpersonal communication, this can lead to frustration, decreased social attachment, or misunderstandings in digital relationships. Comparison with synchronous communication shows that the intensity of emotions in synchronous communication is much higher due to the simultaneity of interaction, voice, facial expressions, and body language.[21]

The novelty of this research lies in the integration of cognitive psychology theory with digital communication practices, particularly in comprehensively examining the impact of asynchronous communication in terms of form, message processing, and emotional responses. Unlike previous research that tends to view digital communication as merely a technical or social medium, this study places asynchronous communication within a psychological framework that explains how users' thoughts and emotions are influenced by time lags in communication. This approach offers a new contribution to the field of digital communication studies and the psychology of human interaction by mapping how asynchrony affects not only the time and method of delivery but also the meaning and emotional nuance of the message.[22] Furthermore, the findings of this study contribute to modern communication practices, such as in online education, digital public services, and religious outreach on social media. Understanding the characteristics of asynchronous communication helps communicators design more adaptive, effective, and empathetic messages appropriate to the digital context. This is where the novelty and academic usefulness of this study lie, which not only describes the phenomenon of digital communication

[20] Baruch Offir et al., "Surface and Deep Learning Processes in Distance Education: Synchronous versus Asynchronous Systems," *Computers and Education* 51, no. 3 (2008), https://doi.org/10.1016/j.compedu.2007.10.009.

[21] Caroline Jay et al., "Modeling the Effects of Delayed Haptic and Visual Feedback in a Collaborative Virtual Environment," *ACM Transactions on Computer-Human Interaction* 14, no. 2 (2007): 8, https://doi.org/10.1145/1275511.1275514.

[22] Grech, "Social Presence and Satisfaction in Asynchronous Text-Based Communications in Online Nursing Education: A Comparison With Synchronous Video Communications."

but also offers cross-disciplinary insights for developing communication strategies based on cognition and affect.

CONCLUSION

A major shift in the modern communications landscape is marked by the increasing use of digital media, which enables asynchronous communication. Asynchronous communication, such as through email, instant messaging, or online forums, has transformed the way individuals interact, construct meaning, and respond to one another in everyday life. Based on the literature reviewed, this type of communication introduces a number of new dynamics, particularly in terms of cognitive processing and emotional responses.

Based on its utilization, Pedagogical Dimension, Internet-based education, Wide Area Network, voice communication, Digital services in healthcare and social welfare, Overview of technology and learning, Virtual learning system, all have a good impact and have a good response for its users, especially in the field of virtual learning system, because it gives the impression and opportunity for children to continue learning even from a distance or from home, teaching the importance of technology for students to continue to develop in the future. Asynchronous communication also significantly influences the formation and emotional response of users. Unlike synchronous communication which allows spontaneous expression and direct emotional response, asynchronous communication makes emotions more filtered.

Cognitively, asynchronous communication requires users to interpret messages without the aid of nonverbal cues, so understanding messages depends heavily on context, personal experience, and the ability to read and structure messages accurately. This creates unique challenges in constructing coherent meaning and avoiding misunderstandings, especially since the indirect response time often results in messages being interpreted differently from their original intent.

From an emotional perspective, this form of communication presents significant complexities. The lack of immediate reactions in asynchronous communication can create feelings of ambiguity, anxiety, and even alienation. However, some individuals also find comfort in having the time and space to think before responding, allowing for greater control over emotional expression. Thus, asynchronous communication is not entirely negative; rather, it presents both challenges and opportunities, depending on how individuals manage their perceptions and expectations.

This study makes an important contribution to enriching the theoretical perspective on digital communication, emphasizing that asynchronous communication is not simply a delayed exchange of messages, but also a complex psychological process involving how humans think,

feel, and respond in a digital context. Therefore, a deep understanding of the cognitive and emotional aspects of asynchronous communication is key to creating more effective, empathetic, and relevant communication patterns in the era of ever-evolving digital interactions.

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