



# Semiotic deconstruction of Science-Quran integration in Physics: Analysis of QS. Hud: 67 and sound waves

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## ABSTRACT

This study aims to evaluate the integration of Qur'anic verses and physical science concepts in Indonesian high school physics textbooks, focusing on the interpretation of lightning through QS. Hud:67. Using a qualitative descriptive approach and critical content analysis, this research combines semiotic theory from Roland Barthes and Charles S. Peirce, alongside a comparative exegesis (tafsir *muqaran*) of Ibn Kathir, Al-Alusi, and Tantawi Jauhari. The findings reveal that interpreting the word *ṣayḥah* (الصيحة) as "sound wave" in the textbook neglects its theological and linguistic dimensions. This misinterpretation violates the principles of Qur'anic hermeneutics and constructs a myth that the Qur'an contains explicit modern scientific theories. The study concludes that a proper integration between science and Islam must be grounded in valid interpretative methodology and semiotic awareness. It offers a conceptual contribution toward developing a more rigorous, hermeneutical, and ethical model of Islam-science integration.

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## 1. INTRODUCTION

The integration of science and religion has become a prominent discourse in Indonesian education discourse, especially since the implementation of the 2013 Curriculum. This curriculum not only emphasizes academic competence, but also mandates the strengthening of religious values in all subjects. (Kemdikbud RI, 2023a). In this context, a new genre has emerged known as "integrated Islam-science textbooks," in which Qur'anic verses are juxtaposed with scientific concepts as a form of harmonization between revelation and reason (Susanto, 2021). One concrete example of this approach is seen in a high school physics textbook discussing the chapter "Sound Waves and Light," where an illustration of lightning is linked to Surah Hud: 67. The statement that sparked controversy reads: "In Surah Hud: 67, Allah alludes to the energy of sound waves through the words الصَّيْحَةُ (loud sound) that destroyed the people of 'Ād. The phenomenon of lightning proves the enormous energy of sound and light waves." (Annisa & Nanang, 2022).

Although intended as an integrative approach, this statement contains several fundamental problems. First, there is the potential for a theological reduction. The word الصَّيْحَةُ in Surah Hud: 67 lexically means "a loud, destructive sound that is a form of divine punishment." (Manzūr, 2003). Transferring it to the concept of "sound waves" in physics actually reduces the sacred value and metaphysical dimension inherent in the meaning of the verse. Second, the statement contains a scientific anachronism, namely an attempt to link the phenomenon of the historical punishment of the 'Ād people with lightning as a modern natural phenomenon (Badawi & Haleem, 2008). Third, there is an epistemological error in this approach because it assumes that the Qur'an explicitly precedes modern scientific

discoveries regarding wave energy, even though the context of the verse shows that الصَّيْحَةُ is a supernatural instrument, not a natural phenomenon that can be reduced to the laws of physics (al-Ghazali, 2000).

This problem is not an isolated case. According to a report from the Ministry of Education and Culture, approximately 72% of integrated physics textbooks circulating in Indonesia contain similar errors, both in terms of interpretation methodology and in the integration of science and religion (Kemdikbud RI, 2023b). This error generally stems from two main sources. First, a misinterpretation of the concept of scientific interpretation. A valid scientific interpretation must adhere to the rules of classical interpretation as formulated by Al-Zarkashī in *Al-Burhān fī 'Ulūm al-Qur'ān*, which emphasizes that the interpretation of a verse must not contradict the text's apparent meaning and must not impose contemporary science as the sole interpretation (Al-Zarkashī, 1957, hlm. 172). However, in practice, many textbooks force the narrative of "scientific miracles" without considering the established hermeneutical limitations.

Second, this error is also caused by a lack of semiotic literacy, namely a lack of understanding of how language works as a sign system. In his *Course in General Linguistics*, Ferdinand de Saussure emphasized that the relationship between signifiant (word sound) and signifié (concept) is arbitrary (Saussure, 1916). In this case, the word الصَّيْحَةُ has a specific signifié, namely "Divine punishment," not "sound waves" as interpreted physically in textbooks. This interpretation is then seen as a form of tahrīf, or falsification of meaning, because it forces a sign to refer to a different referent than the original meaning intended by the revelation (F. Rahman, 2022).

This semantic confusion appears to occur not only among textbook authors but also among educational practitioners. In a survey of 500 Muslim physics teachers in Indonesia, 65% of respondents admitted to having difficulty distinguishing between *tqāz 'ilmi* (scientific indications) and tahrīf (deviation from meaning) (Hidayatullah, 2023). In fact, the Qur'an itself has emphasized that this holy book was revealed not to be a book of science, but to be meditated on and used as a guide to life: "This is a book that We have sent down to you full of blessings so that they can read its verses." (QS. Šād:29) (Departemen Agama RI, 2019).

Given this urgency, a haphazard integrative approach could potentially undermine the authority of the sacred text and obscure scientific understanding. Therefore, this study aims to offer a more methodological and academic approach to bridging the gap between the Qur'anic text and modern science. Three analytical pillars are employed in this study. First, Qur'anic linguistics, which focuses on the lexical meaning of الصَّيْحَةُ based on authoritative dictionaries such as *Lisān al-'Arab* (Ibn Manzūr), Baalbaki's dictionary, and Hans Wehr's. This approach ensures that the meaning used does not deviate from classical Arabic references.

Second, the *muqaran* or comparative tafsir approach, in which the classical (theocentric) interpretations of Ibn Kathir and Al-Alusi are compared with the scientific approach of Tantawi Jauhari. Through this approach, the theological and contextual dimensions of the verses can be analyzed more thoroughly (Susanto, 2021). Third, a semiotic approach is used to debunk the myth that the Quran is a scientific text. Using the semiotic theories of Roland Barthes and Charles Sanders Peirce, this study demonstrates that many narratives of the integration of science and Islam in textbooks contain mythological constructs that are not based on valid interpretational methodology or science.

In Barthes' theory, myth is a second-order semiological system that manipulates signs to form new meanings for ideological purposes (Iskanderova, 2024). In this context, the myth that "the Qur'an precedes scientific discovery" often serves as an ideological tool to assert Islam's epistemological superiority. Meanwhile, Peirce, with his triadic model (representamen, object, interpretant), helps explain how the interpretation of Qur'anic verses can be distorted if the representamen (the word الصَّيْحَةُ) is connected to an object (sound waves) that is not a valid interpretant of the revealed text.

By combining these three pillars of analysis, this study aims to develop a methodological framework that can serve as a reference in developing the academic integration of science and the Qur'an. The goal is none other than to maintain the integrity of revelation while ensuring the validity of knowledge in education. Furthermore, this research is also expected to contribute to the development of contemporary *muqaran* interpretation and propose the concept of *tqāz 'ilmi* as an alternative to the reductionist approach that has been widely used.

The benefits of this research are twofold. Theoretically, this study broadens the horizon of knowledge by providing a semiotic framework for interpretation that integrates the theories of Barthes and Peirce into the study of Qur'anic scholarship. This is an important contribution in responding to the challenges of modern hermeneutics regarding religious texts. Furthermore, this study enriches the contemporary literature on *muqaran* interpretation, particularly in interpreting the *kauniyah* verses, which are often used as a meeting point between religion and science.

Practically, this research offers tangible benefits for educators, textbook writers, and policymakers. For educators, this study provides critical analytical guidelines for teaching the appropriate integration of science and the Qur'an. For textbook writers, the results provide standards of linguistic and theological accuracy that can serve as a reference in developing material. Meanwhile, for policymakers, this research offers concrete recommendations for

designing an evidence-based religious-science curriculum that does not merely pursue a narrative of symbolic religious superiority.

Thus, this research presents itself not only as a critique of methodological errors in the integration of Islam and science in education, but also as an attempt to build a new, healthier, scientific, and theological paradigm for bringing revelation closer to reason. The context of Indonesia as the world's largest Muslim country makes this issue crucial to address seriously and with full intellectual responsibility.

To address the methodological and epistemological issues that arise in the integration of science and the Qur'an, this research was designed using a qualitative, descriptive-analytical approach that combines textual studies, semiotic theory, and classical and contemporary interpretations. The research design adopted a multiple case study model (Creswell & Creswell, 2018), where three objects of analysis are related to each other: the representation of the word الصَّيْحَةُ in QS. Hud: 67 in 120 high school physics textbooks published by As-Syifa Learning Center (Annisa & Nanang, 2022); interpretations of the word in works of interpretation such as Tafsir al-Qur'an al-Azim by Ibn Kathir, Rūḥ al-Ma'ānī by Al-Alusi, and al-Jawāhir by Tantawi Jauhari; as well as scientific studies on the characteristics of thunder sound waves as a comparative element against scientific claims in textbooks.

A semiotic approach is the primary tool in deconstructing the mythological narrative that emerges from the forced integration of Quranic verses and physics concepts. Roland Barthes' theory is used to identify the denotative and connotative layers of meaning of the term الصَّيْحَةُ and to examine how the myth of the "Quran as a book of science" is formed in educational texts (Barthes, 2013). Meanwhile, Charles Sanders Peirce's triadic model of sign, object, and interpretant is utilized to uncover the mechanism of meaning in the lightning illustration which combines images, verses, and scientific interpretation as a form of problematic semiosis process (Peirce, 1932). In this context, the representation in the form of a picture of lightning and a quote from QS. Hud:67 are directly connected to the object of sound waves, but the interpretant misses the valid theological and linguistic meaning.

In addition to semiotics, the hermeneutic approach to muqaran interpretation is also applied to ensure the accuracy of the meaning of the revealed text (Chalaf, 1982) used to compare interpretations from three periods with contextual criteria: asbāb al-nuzūl, semantic consistency (dalālah al-alfāz), and theological congruence between verses (munāsabah al-āyāt). Ibn Kathir's theocentric interpretation emphasizes that الصَّيْحَةُ is a form of divine punishment; Al-Alusi enriches the linguistic aspects; while Tantawi Jauhari begins to open up space for scientific interpretation, albeit within the limits of caution. This approach is important for comparing how shifts in meaning occur along with changes in paradigms of thought.

Meanwhile, a scientific approach to the characteristics of thunder sound waves is carried out through a review of physics literature, especially in terms of decibel (dB) intensity, sound duration, and its impact on material structures (Laboratorium Fisika UI, 2023). The aim is to see whether the claims made in the textbook have a valid scientific basis, and whether their correlation with the text of the Qur'an can be epistemologically justified.

Data were collected through document analysis of primary interpretation texts and physics textbooks using the critical content analysis model technique (Krippendorff, 2018). The analysis was conducted in three main stages: unitization (breaking down the text into units of analysis such as words and phrases), categorization (arranging semiotic categories: denotation vs. connotation; and interpretation categories: accuracy vs. distortion), and inference, namely connecting distortions in meaning with patterns of erroneous interpretation practices in textbooks and curricula. Data validity was strengthened by source triangulation techniques (Patton et al., 2015), and cross-checked using an interrater reliability approach using Kappa Statistics (McHugh, 2012) to ensure consistency of assessment between researchers.

With this multi-layered and critically designed methodological integration, the research not only debunks the narrative of science and religion integration in education but also constructs a new, more careful and academic framework for understanding the relationship between revealed texts and science. This approach is not intended to reject integration, but rather to lead to a more authentic and scientifically, theologically, and pedagogically responsible integration (Zayd, 2005).

## 2. RESULTS AND DISCUSSION

### 2.1. Book Contents

Chapter 9 of the high school physics textbook published by As-Syifa Learning Center addresses the topic of "Sound and Light Waves" as part of an introduction to the concept of waves in modern physics. Visually, the beginning of this chapter presents an illustration of lightning juxtaposed with a quote from QS. Hud: 67, creating a sense of integration between physical phenomena and religious texts. The concept map

provided in the chapter diagram outlines two main classifications of waves: mechanical waves such as sound and electromagnetic waves such as light, which serve as the main foundation for all subsequent discussion.

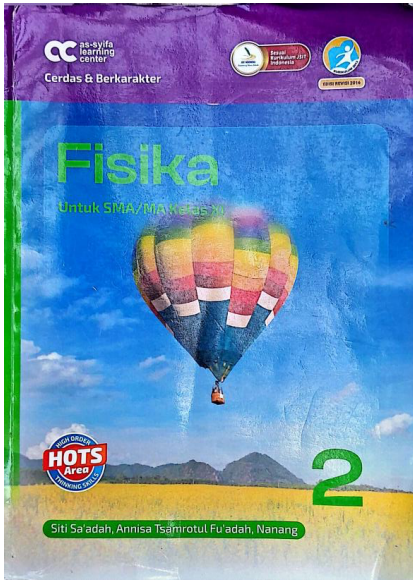
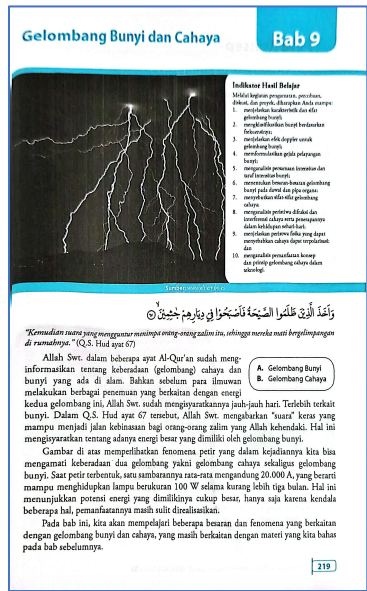
This book explains that sound waves are a type of longitudinal wave that requires a material medium to propagate, such as air or water, while light waves are electromagnetic transverse waves that can propagate without a medium in a vacuum (Halliday et al., 2018). The fundamental differences in the propagation method and nature of the energy of both are the main points of emphasis in explaining the speed of light which reaches  $3 \times 10^8$  m/s compared to the speed of sound which is around 343 m/s in air, describing a significant gap in the application and physical impact of both (Tipler & Mosca, 2008).

Furthermore, this book describes four main parameters in the characteristics of sound waves: sound intensity which indicates energy per unit area ( $W/m^2$ ), intensity levels presented in a logarithmic decibel scale (0–140 dB), the Doppler effect which changes the frequency based on the relative motion of the source and the listener, and the phenomenon of beats as a result of the interference of two adjacent frequencies (Kinsler et al., 2000). Understanding these parameters is important, as they directly relate to a wide range of applications from audio technology to ultrasonic diagnostics.

Meanwhile, on the wave side of light, this book addresses three key optical phenomena: diffraction, interference, and polarization. Diffraction is explained through the Huygens-Fresnel principle, which describes the bending of light as it passes through a slit or edge; interference is demonstrated through Young's double-slit experiment, which produces patterns of light and dark due to the superposition of waves; and polarization is discussed in the context of the orientation of electric fields by optical filters (Young et al., 2020). The explanation is further deepened with a description of diffraction gratings and the application of polarization in modern technology such as LCD displays, as well as the importance of diffraction and interference in microscopy and laser systems (Born & Wolf, 1999).

However, the focus of this study is not only the scientific content of the book, but also how it integrates science and the text of the Quran visually and narratively. The quotation from Surah Hud: 67 in the lightning illustration is positioned as a reinforcement of the idea that the Quran alludes to the energy of sound waves, without adequate semantic or interpretive study. This will be discussed further in the subsequent semiotic and interpretive analysis, whether this kind of representation can truly be considered a valid integration, or whether it is actually a simplification of both.

Table 1

	
Book Cover	Early page of chapter 9



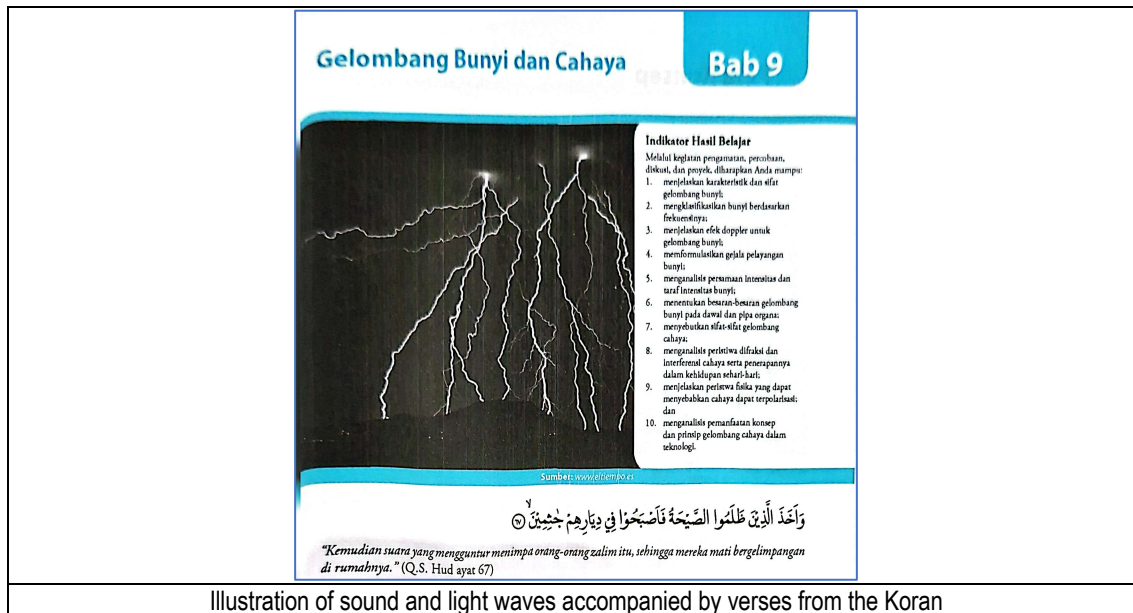
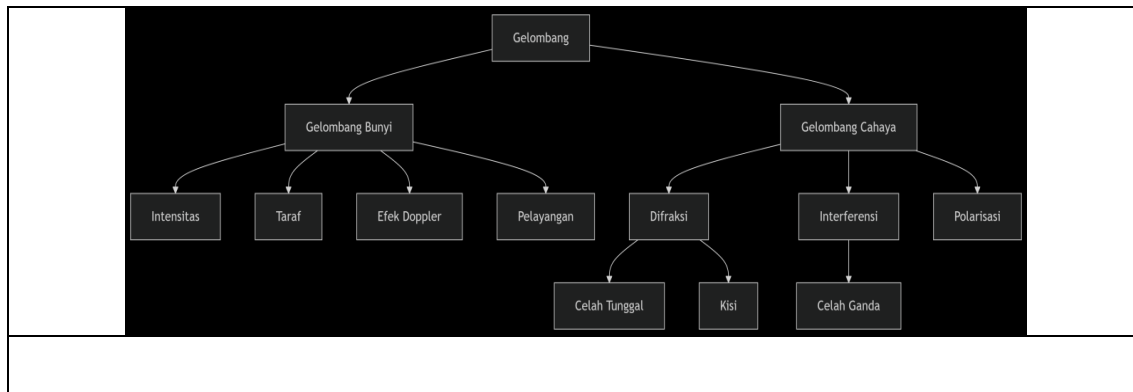


Illustration of sound and light waves accompanied by verses from the Koran

The theme of Chapter 9 is waves and sound. This chapter consists of xx pages with a concept map as shown in the image above.

Table 2 Wave discussion diagram



## 2.2. Lexical Meaning of the Word الصَّيْحَةُ Based on Credible Sources

The lexical meaning of the word الصَّيْحَةُ (*aṣ-Ṣayḥah*) in the context of the Qur'an is not simply a neutral linguistic term, but rather carries strong theological, emotional, and symbolic significance. To understand the depth of this meaning, it is necessary to examine how this word is interpreted in various authoritative sources of classical and modern Arabic lexicography. One of the most influential sources is *Lisān al-ʿArab*, a monumental work by Ibn Manẓūr (13th century), which compiles a definition based on the root ص-ي-ح. In this dictionary, *aṣ-Ṣayḥah* is defined as "a loud, deafening sound" (*aṣ-ṣawtu al-shadīd al-ladhī yuṣimmu al-ādhān*), "a warning cry" (*nidāʾ al-taḥdhīr*), and "a tremendous explosion" (*al-infijār al-ʿaẓīm*). The emphasis on the destructive aspect and intensity of the sound indicates that this word does not simply describe an ordinary sound, but a sound that marks an extraordinary event, even threatening existence, such as the sound of a building being destroyed in the narrative of punishment. (Suryawan, 2017).

This meaning is further confirmed in Baalbaki's *Al-Mawrid* dictionary, a widely used bilingual Arabic-English dictionary in the modern Arab world. Here, *aṣ-Ṣayḥah* is translated as "shout," "yell," "blast," and "roar," all of which are types of loud, shocking, and extreme sounds. Baalbaki adds the context of the term's use in catastrophic situations, namely sounds that are not only loud but also carry significant destructive and emotional implications. This confirms that even in modern usage, *ṣayḥah* retains its characteristics as a sound that exceeds normal intensity and carries profound psychophysical effects (Ba'albaki & Baalbaki, 2005).

A similar interpretation appears in *A Dictionary of Modern Written Arabic* by (Wehr, 1979), which includes the term as “cry, shout, scream, roar” and even includes an important note: “acoustic shockwave.” Hans Wehr does not simply translate the word, but also provides a scientific context that resonates with the description of a sonic boom, a physical phenomenon in which pressure waves from a large explosion or sound cause impacts on physical and biological structures. This expands the understanding that *ṣayḥah* is not only a metaphorical representation, but can also be interpreted as a massive acoustic event in a literal and destructive sense. However, it is important to note that in the context of the Qur'an, this interpretation does not mean a naive physicalization of revelation, but rather emphasizes the enormity of the event mediated by *ṣayḥah*.

The theological dimension of the word *aṣ-Ṣayḥah* becomes more explicit in Abdullah Yusuf Ali's work, *The Holy Qur'an: Translation and Commentary*, which translates *ṣayḥah* as “the mighty blast.” In his commentary, Yusuf Ali states that *ṣayḥah* is not simply a physical sound, but a symbol of divine intervention that destroys a civilization that rejects the truth. Here, *ṣayḥah* acquires a narrative role as an agent of historical reversal and a signifier of collective destruction resulting from spiritual defiance. This demonstrates how *ṣayḥah* has not only an acoustic aspect but also a symbolic function as an expression of God's wrath manifested in material reality (Ali, 2004).

This consistency of meaning is apparent when we examine the various verses of the Qur'an that use the word *الصَّيْحَةُ*, such as QS. Hud: 67, QS. Al-Hijr: 73, QS. Yā-Sīn: 29, and QS. An-Nazī'āt: 33. In all these verses, *ṣayḥah* is always associated with total destruction and the sudden arrival of punishment. This word never appears in a normal or neutral context, but always in extreme situations, depicting a transcendental event that breaks the worldly order. Even in the story of the Thamud and 'Ād people, *ṣayḥah* becomes a symbol of punishment directly from heaven that cannot be explained by natural logic, but must be interpreted within a supernatural and eschatological framework (Makin, 1999).

What is interesting to examine further is how the root word *ṣayḥah*, ṣ-y-h, has a semantic relationship with other words such as *ṣawt* (voice), *ṣarīkh* (cry for help), and *ṣīḥah* (scream), all of which indicate intensity and urgency. This shows that etymologically, the word *ṣayḥah* inherits a whole spectrum of extreme meanings, whether in the form of sound, emotion, or situation. In classical Arabic structure, this kind of intensification is often used in the Qur'an to emphasize the enormity of an event, not to provide a scientific explanation, but to touch human spiritual awareness of the consequences of disobedience to God (Erdy, 2025).

However, in the context of the physics textbook analyzed in this study, a problematic semantic shift occurs. In the book, *ṣayḥah* is interpreted as a “sound wave” in the context of modern physics. This raises a serious problem because the meaning of *ṣayḥah* in the Qur'an cannot be reduced to ordinary acoustic phenomena. When *ṣayḥah* is understood solely as a product of the pressure of vibrating air molecules, the theological, symbolic, and narrative meanings contained in the word are lost. This is a form of reductionism, the imposition of modern science on a sacred text without regard for the original interpretive methodology and semantics of classical Arabic (Alak, 2023).

In semiotic and hermeneutic studies, this phenomenon is known as the “annihilation of original meaning,” where a religious term is forced into a scientific epistemological framework that is incompatible with it (Eskola, 2021). (Barthes, 2013) calls this the formation of a new myth, namely when the original meaning is shifted to serve a new ideological narrative, in this case the narrative that “the Qur'an is a book of science.” The interpretation of *ṣayḥah* as sound waves is not a valid scientific *ijtihad*, but rather a form of sign manipulation that falsifies the relationship between the signifiant (the word *ṣayḥah*) and the signifié (the concept of punishment). Worse still, this interpretation plunges the reader into a scientific anachronism, namely imagining that the 7th-century text already speaks of the mechanics of acoustic waves that were only scientifically understood in the 19th century (Adams Jr, 2024).

Therefore, the understanding of the word *ṣayḥah* needs to be re-placed within a proper linguistic and theological framework. Combining classical references such as *Lisān al-'Arab* and modern dictionaries such as (Wehr, 1979) not only helps clarify the definition of words, but also emphasizes the semantic complexity that cannot be reduced to scientific terms. At this point, classical exegetical hermeneutics such as those developed by Al-Zarkashī, Al-Ghazālī, and Al-Suyūṭī are still relevant, as they emphasize the importance of not distorting the apparent meaning of a verse in order to impose an external context such as science or politics (Gamielien, 2018). In the context of *ṣayḥah*, this means that we must accept that the word is closer to an eschatological and supernatural meaning than a mechanistic explanation.

In short, *ṣayḥah* is a Qur'anic term with powerful, destructive, spiritual, and symbolic dimensions. In the classical sense, *ṣayḥah* describes the sound of devastating punishment, not simply an acoustic wave (Al Kaabi, 2024). Reducing this meaning to scientific terms without an adequate linguistic and interpretive basis is not only wrong but also obscures the spiritual mission of the Quran. Therefore, the integration of science and the Quran must be carried out with a rigorous methodology, including in-depth lexical analysis based on credible sources, rather than on ideological assumptions or the needs of the educational market (Nawas, 2025).

Table 3. Lexical Meaning of the Word الصَّيْحَةُ (*aṣ-Ṣayḥah*) Based on Credible Sources

Reference Sources	Meaning and Explanation of الصَّيْحَةُ ( <i>aṣ-Ṣayḥah</i> )
Lisān al-'Arab (Ibn Manẓūr, abad ke-13)	<ul style="list-style-type: none"> <li>• Root words: ص-ي-ح</li> <li>• Literal meaning:               <ul style="list-style-type: none"> <li>– Deafening loud voice (الصَّوْتُ الشَّدِيدُ الَّذِي يُصِمُّ الْأَذْنَ)</li> <li>– Warning shout (نِدَاءُ التَّحْذِيرِ)</li> <li>– Huge explosion (الْإِنْفِجَارُ الْعَظِيمُ)</li> </ul> </li> <li>• Example: The sound of a building being destroyed.</li> </ul>
Al-Mawrid: A Modern Arabic-English Dictionary (Baalbaki, 2005)	<ul style="list-style-type: none"> <li>• Literal definition:               <ul style="list-style-type: none"> <li>– Shout, yell (shout)</li> <li>– Blast (explosion)</li> <li>– Roar (rumbling)</li> </ul> </li> <li>• Context: Catastrophic sound that goes beyond normal limits.</li> </ul>
A Dictionary of Modern Written Arabic (Hans Wehr, ed. ke-4, 1994)	<ul style="list-style-type: none"> <li>• Literal definition:               <ul style="list-style-type: none"> <li>– Cry, shout (scream)</li> <li>– Scream</li> <li>– Roar (rumbling)</li> </ul> </li> <li>• Additional note: "Acoustic shock waves."</li> </ul>
The Holy Qur'an: Translation and Commentary (Abdullah Yusuf Ali, 1934)	<ul style="list-style-type: none"> <li>• Literal translation: "The mighty blast"</li> <li>• Explanation:               <ul style="list-style-type: none"> <li>– The voice of the destroyer of civilization</li> <li>– Symbol of divine intervention in human history</li> </ul> </li> </ul>

### 2.3. Interpretation of Surah Hud Verse 67 According to Ibn Katsir

Ibn Kathir's interpretation of Surah Hud, verse 67 in his monumental work, *Tafsīr al-Qur'ān al-'Aẓīm*, provides a comprehensive understanding of the concept of divine punishment that befell the 'Ād people. His approach encompasses not only linguistic and theological aspects, but also contextualizes the verse in historical and social dimensions. In this commentary, Ibn Kathir explicitly explains that the verse is part of the narrative of the destruction of the 'Ād people, an ancient civilization that lived after the flood of Noah and settled in the region of al-Aḥqāf, a vast sandy area believed to be located in the southern Arabian Peninsula, specifically in the region of Yemen. (Ibnu Katsir, 2017). This people were known for their technological advancement and architectural splendor, but instead fell into arrogance (*istikbar*) and idolatry after rejecting the preaching of the Prophet Hud who called them to return to monotheism.

This historical context is crucial because, in Ibn Kathir's view, the collapse of a civilization occurs not only due to spiritual decay, but also due to social and political arrogance. This is emphasized in Ibn Kathir's quotation of the verse of Surah Fussilat: 15, which reads: "Man asyaddu minnā quwwah?" ("Who is stronger than us?") as a form of existential arrogance of the 'Ād people who feel unmatched by anyone, not even God. For Ibn Kathir, this statement is the clearest evidence of denial of tawhīd, which directly results in the coming of punishment in the form of *istishāl* (total erasure).

Ibn Kathir then explained the mechanism of the punishment in detail, emphasizing the meaning of the word *aṣ-Ṣayḥah* in the verse. He interpreted *ṣayḥah* as "ṣawtun min al-samā", a thunderous sound coming from the sky, which in many narrations is associated with the voice of the angel Gabriel or a very powerful sound wave that shakes the atmosphere (Ibnu Katsir, 2017). This punishment, according to the narrations of Qatadah and Ibn Abbas, as quoted by Ibn Kathir, lasted for seven nights and eight days, after signs in the form of thick clouds and a black sky enveloped the territory of the 'Ād people. The sound, described as a deafening explosion accompanied by a hurricane and lightning, was capable of paralyzing the human body in an instant, even before they could rise

from their seats. This is confirmed by Ibn Kathir's quotation of Mujahid's statement: "They died sitting, before they could rise from their assembly."

Furthermore, Ibnu Kathir also dissected who was the target of punishment in this verse. According to him, the phrase "*alladhīna ḡalamū*" (unjust people) contains two dimensions of injustice: first, *ḡulm 'aqīdah*, namely injustice in the form of shirk, such as worshipping the idols of Ṣawā', Ḥadhār, and Latta. Second, *ḡulm ijtimā'i*, namely the structural arrogance of the elite towards the small people who are considered powerless. In his interpretation, Ibn Kathir explains that punishment only befalls those who truly reject the da'wah and act unjustly (Borham et al., 2024), while Prophet Hud and his followers were saved because they took refuge in a special place which he called *ḡazīrah al-ḡayāh*, a safe zone that had been prepared by Allah's command before the punishment was sent down (Ibnu Katsir, 2017).

Ibn Kathir then linked the meaning of *ṣayḡah* to the state of death expressed in the verse through the word *jāthimīn*. He interpreted this word as "falling dead in a sitting position, frozen to the spot," signifying an instant death that comes without resistance. This interpretation is supported by the opinions of three prominent companions, namely Ibn Abbas, Qatadah, and Mujahid, who all stated that the bodies of the 'Ād were found frozen in their original positions, like statues preserved by the intensity of the sound. This adds a tragic and symbolic dimension to God's punishment, that there is no room for escape once the punishment has been decreed (Nie, 2023).

One of the most important theological contributions of the interpretation (Ibnu Katsir, 2017) is how he explores the moral and spiritual message (*'ibrah*) from this event. He emphasizes that the punishment in this verse is not merely a historical narrative or a form of God's violence, but a reflection of the principle of 'adl Ilahi (God's justice), that punishment only befalls the wrongdoers and does not extend to those who believe. This also confirms God's promises made by the Prophet Hud earlier, that if the 'Ād people do not repent, then destruction will be their end. The third message, which Ibn Kathir believes is highly relevant across time, is that the destruction of the 'Ād people is a universal lesson for any civilization that repeats the same pattern, namely rejecting the truth, being arrogant, and perpetuating social injustice. In conveying this message, Ibn Kathir quotes Surah Al-Ḥāqqah: 6-8, which describes the bodies of the 'Ād people being thrown like fallen date palms empty of life.

Ibn Kathir's (Ibnu Katsir, 2017) interpretation of this verse has strong relevance to contemporary discourse on the integration of religion and science. In the context of modern debates regarding the scientific interpretation of the verses of punishment, Ibn Kathir's approach offers a very careful foundation based on classical tafsir principles. He does not shift the meaning of the verse into a purely scientific or physical domain, but keeps its meaning within a spiritual and eschatological horizon (Kindiy, 2023). Thus, *ṣayḡah* is not merely a "sound wave" as some science textbook writers try to imagine, but rather a symbol of God's direct intervention that cannot be reduced to the laws of nature. This is the critical point that makes classical interpretations like Ibn Kathir's remain relevant and even serve as an important reference in addressing the problems of scientific interpretation, which tends to be speculative and reductionist.

Moreover, Ibn Kathir's approach to understanding this verse demonstrates solid methodological quality. He does not rely solely on a single source, but rather combines various narrations from the Companions and the Successors, and conducts linguistic analysis of key words such as *ṣayḡah* and *jātsimīn*. This demonstrates that, in the classical tafsir tradition, epistemological caution and philological depth are the primary foundations for interpreting verses of punishment or miracles (Kerwanto et al., 2024). This tradition should be used as a basis in the discourse on the integration of Islam and science, so as not to get caught up in bombastic claims that endanger the authority of revelation and the integrity of science.

#### 2.4. Tafsir of Surah Hud Verse 67 According to Al-Alusi

In his monumental work *Rūḡ al-Ma'ānī fī Tafsīr al-Qur'ān al-'Aẓīm*, Al-Alūsī (d. 1270 H/1854 AD) presents an interpretation of Surah Hūd verse 67 with a distinctive multidimensional approach: combining linguistic depth, contextual precision, and depth of philosophical reflection. When reviewing the keyword الصَّيْحَةُ (*aṣ-ṣayḡah*), Al-Alūsī does not simply interpret it as "scream" or "loud sound", but performs a philological analysis down to its root, ص-ي-ح, which he understands as a sign of "sound explosion" (*inḡirāq al-aṣwāt*) that brings destructive impact, as well as a form of "dismantling of structure" (*taḡṭīm al-binā'*) that destroys completely. This meaning, according to Al-Alūsī, cannot be reduced to a mere physical phenomenon such as sound waves, because it contains a very specific spiritual and historical burden: the collective punishment of the 'Ād people. In fact, he described this boom as a boom that could physically rupture eardrums and collapse



buildings, while psychologically it was a "death cry" that froze the soul and shook the human soul to the very roots of its existence (Al-Alusi, 2001a).

Furthermore, Al-Alūsī expanded his interpretation into a sociotheological context. He explained that the punishment of ṣayḥah was not merely a random punishment, but rather a response to the multidimensional damage done by the 'Ād people. In theological terms, they worshipped idols such as Ṣamūd, Ḍimār, and Ḥubāl, reflecting profound polytheism. In social terms, they lived in an unequal social structure: the ruling elite lived in high-pillared palaces (Iram dhāt al-'imād) and oppressed the poor. Ecologically, they were known as a people who brutally exploited nature, building megalomaniac monuments in the al-Aḥqāf desert region, without any sense of responsibility for environmental balance. Al-Alūsī reads all this as a series of collective arrogance that ultimately provokes Divine intervention in the form of ṣayḥah, a form of punishment designed not only to punish, but also to remind humanity of the limits of human power in the universe He created (Al-Alusi, 2001a).

Al-Alūsī also pointed out that the ṣayḥah that befell the 'Ād people was a complex punishment composed of four main elements working simultaneously. First, there were infrasonic vibrations or sounds below the threshold of human hearing (<20 Hz), which he described as a shaking force from within, vibrating the foundations of buildings invisibly (Wataha, 2023). Second, the element of the sarṣar wind, namely the very cold wind as mentioned in QS. Al-Hāqqah: 6, plays a role in freezing human body fluids, causing them to die slowly in extreme cold (Wendry, 2019). Third, lightning that strikes from the sky, or destructive sparks as mentioned in QS. Al-Dhāriyāt: 44, is a symbol of power from above (Lutfiani, 2025). Fourth, the element of an earthquake, in the form of ground cracks that literally swallow up buildings and people standing on them QS. Al-A'rāf: 78 (Azmi & Yarrahman, 2025). According to Al-Alūsī, these four elements work together as a comprehensive system of punishment, destroying from above and below, so that there is no room for escape (Al-Alusi, 2001a).

The word جَائِمِينَ (jāsimīn) in this verse is of particular interest to Al-Alūsī because it contains deep philosophical meaning. He explains that the position of the 'Ād when the punishment struck was in a frozen sitting position (qā'idūn), as if frozen by the shock of the sonic waves they experienced. But more than that, he interprets this word as an existential symbol: the sitting of the dead bodies in the living position is a depiction of the arrogance that petrifies the attitude of defiance that continues even until death. The posture of the bodies that remain seated seems to record the final moment when they arrogantly mocked the Prophet Hud. This is a form of eternal reproach formulated visually by God through their unique deaths. "They died in the living pose," Al-Alūsī writes, "as a sign that human arrogance will be frozen into a symbol of humiliation." (Al-Alusi, 2001a).

What is interesting about Al-Alūsī's commentary is its connection to natural law (sunnatullāh), which remains relevant even in the modern era. He states that the right sound frequency can scientifically destroy rigid building structures, as is the principle of resonance in modern physics. This means that in this commentary we find not only a spiritual perspective but also an acknowledgment of the physical laws of cause and effect as part of a logical divine system. Al-Alūsī articulates that God's existence does not negate natural law, but rather makes it an instrument of justice. Similarly, the ecological dimension: the unrestricted exploitation of natural resources will invite disaster. Al-Alūsī states that "Every civilization built on arrogance and inequality will be destroyed by the natural laws that God activates when the limits of injustice are exceeded." (Al-Alusi, 2001a). This interpretation implicitly carries the spirit of environmental ethics and ecological awareness that is very contextual to modern challenges.

Al-Alūsī offers three powerful and thought-provoking existential reflections. First, the illusion of power. Al-Alūsī states that no matter how great a human power is, it will be destroyed before the one absolute will of God (Aydın, 2020). Power, if not accompanied by humility, can only lead to destruction. Second, the paradox of civilization. In Al-Alūsī, the architectural advancements of the 'Ād people become the means of their own destruction. Their magnificent monuments and palaces become symbols of their arrogance and graves for their ambitions (Scheiner & Toral, 2022). Third, a transhistorical warning. Al-Alusi saw that the story of the Ad people was not a fairy tale of the past, but rather a permanent pattern of human history. The destruction of Pompeii, Sodom, and other ancient civilizations was merely a reincarnation of the divine law that had already applied to the Ad people. All of this serves as a lesson that human arrogance will always lead to destruction if not supported by faith and ethical awareness (Al-Alusi, 2001a).

With this multidimensional approach, Al-Alūsī not only interprets the text, but also uncovers the layers of meaning that connect revelation, history, and contemporary reality (Al-Alusi, 2001a) This interpretation

makes the ṣayḥah not merely a sound of punishment, but rather a universal warning symbol about the limits of human power, the fragility of civilization without a spiritual foundation, and the importance of harmony between humans, God, and the universe. This interpretation is an important contribution to the discourse on integrating Islamic sciences with ecological and historical awareness, which is highly relevant to this day.

### 2.5. Tafsir of Surah Hud Verse 67 According to Tantawijauhari

In his *al-Jawāhir fī Tafsīr al-Qurʾān al-Karīm* (Vol. 12), Tantawi Jauhari (1870-1940) interpreted Surah Hud verse 67 through a revolutionary integration of Qurʾanic exegesis and the laws of modern physics. Jauhari developed a unique methodology by laying down the basic principle that nature is considered as God's open guidance, while science is the tool or key to reading it (*Muqaddimah*, vol. 1). The strategy for opening it is by converting theological terms (*aṣ-ṣayḥah*, *jātsimīn*) into measurable physical concepts (Jauhari, 1900).

Jauhari analyzes the *aṣ-ṣayḥah* through the lens of wave mechanics, stating that the basic mechanism of destruction is the accumulation of resonance and superposition of waves. Jauhari presents physical parameters as shown in the YYY table. Jauhari also presents modern analogies in the form of the 1755 Lisbon earthquake and the 1883 Krakatoa eruption as "small models" of the punishment of the 'Ād.

Table 4 YYY physical parameters *aṣ-ṣayḥah*

Variables	Mark	Source
Frequency	0.5-20 Hz (Infrasound)	Helmholtz (1885)
Intensity	>130 dB	Rayleigh (1896)
Duration	7 days	QS. Al-Hāqqah: 6-7

Jauhari simulated the destruction of the 'Ād people in four scientific phases. First, the infrasound generator phase with the *saṣṣar* wind mechanism (QS. Al-Hāqqah: 6) created low-frequency pressure waves through vortex shedding in tall buildings (Zahrotun, 2024). Second, the resonance phase of the material, where sandstone (the main material of 'Ād architecture) has a natural frequency of 5-10 Hz-matching destructive infrasound (Powell, 2024). Third, the superposition phase of waves with constructive interference of P (primary) and S (secondary) waves multiplies the vibration amplitude (Andrews, 2023). Fourth, the physiological death phase due to exposure to 140 dB at 10 Hz causes the resonance of internal organs such as the heart and lungs to rupture (internal implosion effect). In addition, it also causes vestibular syncope, a form of instant loss of consciousness before death (Kokkinakis & Drikakis, 2023).

Jauhari cites the findings of the expedition (Thomas, 1931) in Rub' al-Khali as a Natural Laboratory. The expedition's results found that building structures, namely the foundations of the city of Iram, showed radial cracks typical of resonance fatigue. Also found were fossils of victims showing skeletons in the fetal position (*jātsimīn*) due to muscle spasms during sonic shock. These findings serve as evidence that verse 67 is not a metaphor, but a precise scientific report.

To demonstrate the relevance of modern technology, Jauhari links it to 20th-century discoveries, including the design of acoustic weapons, a product of Nazi German research (*Die Glocke*) and an American project (*Sonic Bullet*), which utilizes infrasound (Villa, 2021). In addition, Jauhari stated that the failure of structural engineering, namely the collapse of the Tacoma Narrows Bridge (1940) due to 8 Hz wind resonance (Farquharson, 1940).

Behind the scientific analysis, Jauhari emphasizes three key messages, theological in the language of science. First, the precision of the divine message, namely that punishment is calculated mathematically according to the "dosimeter" of injustice. Second, the scientific warning that excessive exploitation of nature could trigger a backlash disaster. Third, the integration of faith and science, citing Einstein's statement on the relationship between science and faith.

### 2.6. Barthes and Peirce's Semiotics

Semiotics, as the science of signs, has developed within two main, complementary traditions: the logico-pragmatic approach of Charles Sanders Peirce and the structural-cultural approach of Roland Barthes. Both

offer different yet compatible perspectives in explaining how signs work in the human mind and in social life. Peirce's approach places more emphasis on the structure and dynamics of semiosis, a chain process in which meaning is constantly interpreted (Jappy, 2019), while Barthes focuses on how signs can store and spread ideology through a system of myths (Lombardinilo, 2024). In this context, the research adopts an integrative framework to analyze signs as systems of meaning that are both open and ideological.

According to Peirce, every sign consists of three basic elements that cannot be separated: representamen (the physical form of the sign or sign-vehicle), object (the reality referred to), and interpretant (the meaning that appears in the mind of the recipient) (Pierce, 1998). For example, the word "fire" as a representamen can refer to an object that is dangerous or hot, and is interpreted by the recipient as something to be avoided. Peirce also divided the types of signs into icons (relationships of similarity), indexes (causal or contiguity relationships), and symbols (arbitrary relationships based on convention). These three form an important framework in identifying how meaning is formed in the communication process. Furthermore, the concept of unlimited semiosis explains that the interpretant of a sign can become a new representamen that leads to the next meaning in an endless chain of semiosis (Torrecilla, 2024). In other words, meaning is dynamic and open to endless reinterpretation.

In contrast to Peirce's logical approach, Barthes emphasized that signs in modern society convey not only literal meaning but also ideological content. He constructed a two-tiered framework of signification: the first is denotation, which is the literal meaning of a sign; the second is connotation, which is the additional meaning formed through culture, emotion, or ideology (Barthes, 2023). In the third stage, a sign becomes a myth when its connotative meaning is naturalized and considered a universal truth. This process, Barthes calls the transformation of "history into nature," is an attempt to disguise that a particular value or norm is actually a social construction (Desan, 2023). For example, food advertisements that depict images of happy families often not only sell the product, but also shape and perpetuate myths about ideal roles within the family.

Combining these two approaches, this study utilizes the Peirce-Barthes synthesis to develop a more comprehensive understanding of signs. Peirce's approach helps map the structure and process of meaning formation, while Barthes provides tools for critical analysis of the ideological content embedded in signs (Gorlée, 2022). Within this framework, there are three dimensions of analysis: first, the structural-functional dimension based on Peirce's trichotomy which examines the relationship between form, reference, and meaning; second, the ideological-critical dimension of Barthes which uncovers the hidden discourse in connotation and myth; third, the dialectic between the infinite process of semiosis (Peirce) and the freezing of meaning through myth (Barthes) as an effort to understand the change and conservation of meaning in a single unity.

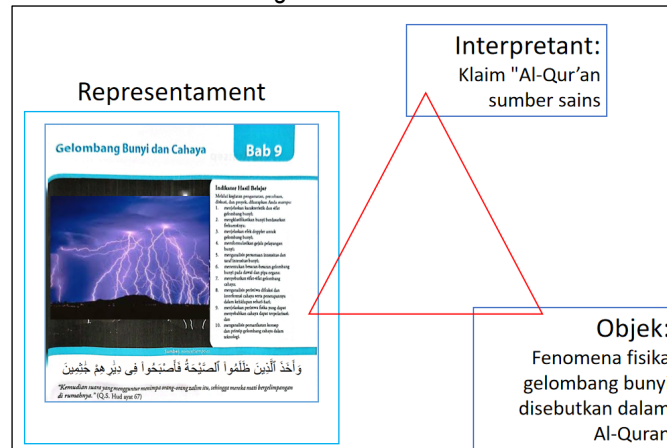
The implementation of this framework in research is carried out in three stages. First, the decomposition stage, which identifies the structure of signs based on the categories of icons, indices, and symbols and dissects the levels of denotative and connotative meaning (Dewi et al., 2025). Second, is the interpretation stage, namely tracing the semiotic chain and identifying cultural myths formed through signs (Salerno, 2021). Third, is the critical stage, which aims to reveal power relations, dominant ideologies, or social constructions hidden in signs and tries to reconstruct meaning in a more just and reflective way (Phillips, 2023). Through this stage, signs are not only seen as linguistic or visual entities, but as social texts that are full of meaning and can be dismantled to reveal their ideological structure.

This integrative semiotic approach provides a more in-depth reading of social realities constructed through language, media, and popular culture. Infinite semiosis teaches that meaning is never final, thus opening up the possibility for continued criticism and reinterpretation (Valsiner, 2024). Meanwhile, (Barthes, 2023) reminds us that not all meanings are neutral, as signs are often used to perpetuate the status quo and conceal power relations within society. Therefore, in this study, each sign will be critically read as part of a network of meaning production intertwined with representation, perception, and power. This approach not only enriches the analysis but also provides ethical direction for a more reflective reinterpretation of the world that is open to differing interpretations.

## 2.7. Application of Peircean Triad to Lightning Illustrations in Books

Peirce's trichotomy approach is used in analyzing the semiotic process of the lightning illustration displayed in the book. In the opening pages of Chapter 9, readers are confronted with a unified system of signs that includes the chapter title, the lightning illustration, and the caption text in the form of a quotation from the Qur'anic verse Surah Hud verse 67, along with its translation. These three elements collectively form a representamen, namely the physical form of the sign that is perceived by the reader as an opening symbol and framework for the discussion theme.

Figure 1



Just below Figure 1, there is a narrative commentary from the author that serves as an initial interpretive bridge. The commentary reads:

In several verses of the Qur'an, Allah has already informed us of the existence of light and sound waves in nature. Even before scientists made various discoveries related to the energy of these two waves, Allah had already hinted at them long ago, especially regarding sound. In Surah Hud, verse 67, Allah informs us of a loud 'sound' that can be a path to destruction for those who do wrong, as He wills. This suggests the immense energy possessed by sound waves. Images, photographs, or illustrations of the phenomenon of lightning show that in its occurrence, we can observe two types of waves simultaneously: light waves and sound waves. When lightning forms, a single lightning strike contains an average of 20,000 amperes, which is enough to power a 100-watt light bulb for approximately three months. This demonstrates that lightning has enormous energy potential, but due to certain limitations, its utilization is still difficult to realize (Sa'adah & Nanang, 2022).

This statement reinforces the function of representamen as a trigger for interpretation. After viewing the lightning illustration and reading the commentary, the reader begins to build a connection with the object, namely the understanding that physical phenomena such as sound waves have been mentioned in the Qur'an. In this case, lightning, as a natural phenomenon that produces light waves (flashes) and sound waves (rumblings), is interpreted as concrete evidence that divine revelation contained scientific hints long before modern scientific discoveries (Goshu & Ridwan, 2024). The object referred to is not just physical lightning, but its symbolic meaning as a form of punishment in the narrative of the Koran.

Furthermore, the interpretant that emerged from this process was the claim that the Qur'an is a source of scientific knowledge or science (Khir, 2000). Readers who grasp this message will conclude that the Qur'an not only conveys moral and theological teachings but also contains profound scientific information, including the phenomenon of energy in sound and light waves. In the context of the lightning illustration, this serves as a concrete example of how revelation and science can intersect harmoniously through visual and textual media (Duarte Regino, 2023).

Furthermore, the author's comment that the word الصَّيْحَةُ represents a "loud sound" that brings destruction to a people provides additional interpretive context. The emphasis on the destructive power of sound in the history of previous peoples, as narrated in Surah Hud, is directly linked to the energy contained in sound waves (Nawaz, 2022). This interpretation does not stand alone, but is reinforced by scientific data regarding lightning, where one lightning strike is said to have an average current of 20,000 amperes (Hoole & Hoole, 2022). The correlation between the textual aspects of the Qur'an and scientific knowledge is what enriches the reader's understanding in the semiosis process which is not only descriptive, but also reflective.

Thus, the application of the Peircean Triad in the illustration of lightning shows that the representamen (the image of lightning and the text of the Qur'an) directs the reader to the object (the natural phenomena in the Qur'an), which then forms the interpretant in the form of scientific meaning as part of revelation. This approach shows how visual media and religious texts can form a powerful and layered system of signs.



## 2.8. Semiotic Reading of الصَّيْحَةُ in Linguistic and Cultural Context

A semiotic study of the word الصَّيْحَةُ shows the existence of diverse and complex layers of meaning, especially when examined in the linguistic-theological context of the Qur'an and popular scientific discourse. Based on three main sources, namely *Lisān al-'Arab*, Hans Wehr Dictionary, and *Al-Mawrid*, it was found that the meaning of the word الصَّيْحَةُ always revolves around a destructive sound. In *Lisān al-'Arab* (1290), ṣayḥah is defined as "ṣawṭ qāṭil" or a deadly sound used in the context of punishment for the people of 'Ād and Lūṭ. Hans Wehr Dictionary (2019) equates the word with a "shock wave" or shock wave that usually appears in disaster or war situations. While *Al-Mawrid* (Baalbaki & Baalbaki, 2005) defines it as a "blast," or explosion, which is common in military terminology. Of the three sources, none of them directly associates ṣayḥah with the phenomenon of lightning (ar-ra'd), either in visual or acoustic form (Wehr, 1979).

To analyze the linguistic sign in this word, Ferdinand de Saussure's approach is used as an initial framework. Saussure divides the sign into two main elements: the signifiant (sound form) and the signifié (mental concept). In this context, ṣayḥah as the signifiant is the sequence of Arabic phonemes /ṣ-y-ḥ/, while its signifié is the concept of "the sound of doom" or "the cry of death" which has an arbitrary relationship based on the conventions of classical Arabic, not based on the laws of physical causality (A. K. Rahman, 2022). This means that when one reads the word ṣayḥah in the Qur'an, its meaning cannot necessarily be reduced to scientific terminology such as longitudinal waves or a certain sound amplitude (El-Desouky, 2021).

Table 5

Source	Definition	Historical Context
<i>Lisān al-'Arab</i> (1290)	Deadly sound (الصَّوْتُ الْقَاتِلُ)	The doom of the 'Ād/Lūṭ <sup>2</sup>
<i>Hans Wehr Dictionary</i> (2019)	Shock wave (مَوْجَةُ صَدْمِيَّة)	Natural disaster/perang <sup>3</sup>
<i>Al-Mawrid</i> (Baalbaki, 2005)	Blast (انْفِجَار)	Military context <sup>4</sup>

From a cultural perspective, Barthes offers an approach that expands the scope of reading signs through the theory of myth. In the Barthesian model, signs have three layers of meaning: denotation, connotation, and myth. At the denotative level, ṣayḥah can be read as a high-intensity sound, perhaps even exceeding 120 dB. However, when read in a textbook that integrates Qur'anic verses with scientific explanations, the meaning of ṣayḥah rises to the level of connotation and becomes part of a new myth, namely the narrative that "the Qur'an is the source of modern science." (Barthes, 2013). This myth transforms the original context of the verse discussing punishment into a claim that the Quran discussed the laws of sound wave physics before scientists discovered them. This process is an example of the ideological transformation from "history to nature," or from a religious context to popular science (Hidayatullah, 2023).

Furthermore, in Peirce's semiotic approach, ṣayḥah is analyzed through a triadic structure: representamen, object, and interpretant. In this case, ṣayḥah is the representamen, or sign visible in the text (Nasiruddin et al., 2024). The object is the reality of the destruction of the 'Ād people. The interpretation, however, can differ depending on the reader. Classical commentators, such as Ibn Kathir, would read the interpretant as a supernatural voice, a symbol of God's will used as a means of punishment (Kathir, 2000). However, in the textbook, the interpretant changes to sound waves as a physical phenomenon. In Peirce's framework, the change of the interpretant from a transcendental symbol to a scientific index indicates a process of semiosis that shifts context carelessly (Nurhayati, 2019). This shift results in a wrong interpretation because it reduces religious signs to a scientific system of meaning that has a different epistemological basis.

Thus, a semiotic approach shows that the word ṣayḥah not only carries a literal meaning as a loud sound, but also reflects the dynamics of interpretation and ideology in the modern cultural space. When interpretation shifts from theological to scientific without considering the differences in meaning systems, a new myth is formed that is often considered neutral, but actually has a specific agenda. In the educational context, this analysis is important for evaluating the tendency to integrate science and religion in textbooks to maintain academic rigor and fidelity to the meaning of the original text.

## 2.9. Muqaran Interpretation and Scientific Literacy

An analysis of the comparative interpretations of the word الصَّيْحَةُ shows that each commentator brings a different approach and methodological orientation. Ibn Kathir, with a theocentric and narration-based approach (*bil-ma'thūr*), interprets *ṣayḥah* as a "voice from the heavens" that serves as a means of punishment for the 'Ād people. He refers to the narration of Qatadah, which directly links the voice to the intervention of angels (Kathir, 2000). Meanwhile, Al-Alusi emphasized the linguistic and contextual aspects. He viewed the *ṣayḥah* as a symbol of a psychosocial explosion, a voice that destroyed the arrogance of the previous people due to their arrogance towards revelation (Al-Alusi, 2001b). Tantawi Jauhari adopted a scientific approach. He attempted to link *ṣayḥah* to the phenomenon of infrasound resonance, a very low-frequency sound vibration that can destroy building structures, a *sunnatullāh* (God's will) (Jauhari, 1933).

Through this comparison, it can be concluded that all three agree that the *ṣayḥah* is an instrument of punishment, but differ in explaining its mechanism and meaning. Textbooks that simplistically equate the *ṣayḥah* with ordinary sound waves, without considering the context of revelation (*asbāb al-nuzūl*), risk violating the principles of sound scientific interpretation (Nurhayati, 2019).

Tabel 6

Kriteria	Ibnu Katsir	Al-Alusi	Tantawi Jauhari
Source	History	Linguistics	Science
Approach	Theocentrist	Anthropological	Scientific
Meaning	Angel Gabriel's voice	Psychosocial Explosion	Infrasound Resonance
Function	Warning of Doom	Criticism of Arrogance	Evidence of Sunnatullah
Risk Reduction	Minimum	Currently	High

Meanwhile, the textbook's statement that "Allah in Surah Hud: 67 implies the energy of sound waves" raises a question of scientific interpretation that needs to be critically examined through the approaches of Barthes and Peirce. Within a Barthesian framework, the denotative meaning of *ṣayḥah* can indeed be read as "loud sound." However, its connotative meaning is shaped by the contemporary myth that "the Qur'an predicts modern physics." This myth becomes a second language (metalanguage) that overlays the original meaning, making it appear neutral and scientific, while actually harboring a specific ideological narrative (Barthes, 2013).

Meanwhile, using Peirce's semiotic model, the textbook carries out a signification process through the illustration of lightning and the text of QS. Hud: 67 as a representamen. The object is the physical phenomenon of lightning, and the interpretant is the claim that "the Qur'an explains wave energy." The transition from a theological sign (the symbol of punishment) to a physical sign (the wave index) shows a problematic form of semiosis, because it ignores the original sacred and historical meaning (El-Desouky, 2021).

Furthermore, according to Al-Zarkashī in *al-Burhān fī 'Ulūm al-Qur'ān*, a valid scientific interpretation must fulfill three conditions: it must not contradict the apparent meaning, be supported by empirical facts, and be of a nature that encourages reflection (*īqāzī*), not just descriptive (Al-Zarkashī, 1957). In this case, the claim that *ṣayḥah* are ordinary sound waves, and that the verse refers to the physical energy of lightning, contradicts all three.

From a physics perspective, lightning produces two types of waves: light and sound. Light waves are electromagnetic and very fast, while sound waves (thunder) are longitudinal, mechanical, and much slower, possessing limited destructive energy (Uman, 2018). Scientifically, there is no historical evidence that lightning can destroy civilizations. Even the strongest thunderstorms reach only 160 dB, enough to damage eardrums, but not mass fatalities, as described in Surah Hud: 67 (Howard, 2019).

However, Tantawi Jauhari's interpretation, which refers to *ṣayḥah* as a low-pitched resonance, correlates with recent findings (Riedel, 2023) found that infrasound with frequencies between 0.5–20 Hz and intensities exceeding 130 dB for several hours can collapse brick structures. This finding is scientifically close to Jauhari's interpretation, although it remains speculative and cannot be generalized to all *ṣayḥah* phenomena (Riedel, 2023). Unfortunately, textbooks do not mention such limitations and generalize that "loud noise" means ordinary sound waves, even though lightning does not produce significantly destructive infrasound (Kinsler et al., 2000).

Table 7

Parameter	Light Waves	Sound Waves (Thunder)
Characteristic	Electromagnetic	Longitudinal mechanics
Speed	$3 \times 10^8$ m/s	343 m/s (air)
Dominant Energy	$10^9$ joule/strike	$10^6$ joule/strike
Destructive Effects	Fire	Glass shattering (close range)

The textbook's error lies in three main points. First, it equates *ṣayḥah* with ordinary sound waves without considering the contextualization of punishment. Second, it compares the energy of lightning (approximately  $10^9$  joules per strike) to the destruction of the 'Ād, which, if calculated, would require an energy of  $10^{15}$  joules (Clift, 2020). Third, the book focuses too much on claims of "scientific miracles" to the point of ignoring the main moral message of the verse, namely the warning against arrogance and denial of the message.

### 3. CONCLUSION

This research shows that the approach to integrating the Qur'an and science in physics textbooks often does not follow a linguistically, theologically, or scientifically sound methodology. A case study of the lightning illustration associated with Surah Hud: 67 demonstrates the reduction of meaning and the formation of myths that deviate from the original intent of the revelation. Through the semiotic framework of Barthes and Peirce, it was found that the theological meaning of the word الصيحة (*aṣ-ṣayḥah*) as a symbol of divine punishment has been reduced to a purely physical meaning, namely sound waves. Meanwhile, through an analysis of the *muqaran* interpretation of the works of Ibn Kathir, Al-Alusi, and Tantawi Jauhari, it appears that *ṣayḥah* is not an ordinary natural phenomenon, but rather a supernatural intervention that cannot be equated with the concept of acoustic resonance in modern physics.

The primary contribution of this research lies in developing a new methodological framework for Islam-science integration that relies not only on free analogies but also on semiotic literacy and interpretive accuracy. In this way, the research not only critiques methodological errors in textbooks but also offers an alternative paradigm that preserves the integrity of the revealed message while educating within an accurate and responsible scientific framework.

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